AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:21-CV-01101	10/22/2021	Western District of Texas

PLAINTIFF	DEFENDANT
AIRE TECHNOLOGY LIMITED	APPLE INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,581,706	11/12/2013	Aire Technology Limited
2	8,205,249	6/19/2012	Aire Technology Limited
3	8,174,360	5/8/2012	Aire Technology Limited
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

Print Save As... Reset

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:21-cv-01104	10/25/2021	Western District of Texas

PLAINTIFF	DEFENDANT
AIRE TECHNOLOGY LIMITED	GOOGLE LLC

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,581,706	11/12/2013	Aire Technology Limited
2	8,816,827	8/26/2014	Aire Technology Limited
3	8,205,249	6/19/2012	Aire Technology Limited
4	8,174,360	5/8/2012	Aire Technology Limited
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
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DECISION/JUDGEMENT

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Print Save As... Reset

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:21-cv-00955	9/15/2021	Western District of Texas

PLAINTIFF	DEFENDANT
AIRE TECHNOLOGY LIMITED	SAMSUNG ELECTRONICS CO., LTD.; and SAMSUNG ELECTRONICS AMERICA, INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,581,706	11/12/2013	Aire Technology Limited
2	8,816,827	8/26/2014	Aire Technology Limited
3	8,205,249	6/19/2012	Aire Technology Limited
4	8,174,360	5/8/2012	Aire Technology Limited
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
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DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

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Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	11/12/2013	8581706	FINK3009/TJM/TL	7360

23364 7590 10/23/2013

BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 1210 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Klaus Finkenzeller, Unterf¿hring, GERMANY;
Karl Eglof Hartel, M¿nchen, GERMANY;
Denny Brandl, Eching, GERMANY;

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23364 7590 07/12/2013
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/TJM/TL	7360

TITLE OF INVENTION: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	10/15/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BEE, ANDREW W.	2689	340-010410

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Bacon & Thomas, PLLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: GIESECKE & DEVRIENT GMBH

(B) RESIDENCE: (CITY and STATE OR COUNTRY): MUNCHEN, GERMANY

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☒ Publication Fee (No small entity discount permitted)
☒ Advance Order - # of Copies 3

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 02-0200 (enclose an extra copy of this form).

PTOL-85 (Rev. 02/11)

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29	NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27	NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.	NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Thomas J. Moore/ Date October 11, 2013

Typed or printed name THOMAS J. MOORE Registration No. 28974

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Electronic Patent Application Fee Transmittal

Application Number:	12304653
Filing Date:	04-Mar-2009
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Filer:	Thomas J. Moore/Kaitlyn Miller
Attorney Docket Number:	FINK3009/TJM/TL

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	1780	1780
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
Printed Copy of Patent - No Color	8001	3	3	9
		Total in USD ($)		**2089**

Electronic Acknowledgement Receipt	
EFS ID:	17108716
Application Number:	12304653
International Application Number:	
Confirmation Number:	7360
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	FINK3009/TJM/TL
Receipt Date:	11-OCT-2013
Filing Date:	04-MAR-2009
Time Stamp:	16:11:35
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$2089
RAM confirmation Number	3257
Deposit Account	020200
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	FINK3009_IF.pdf	125029 b2f05c9282de1e436b6d36f5b6b23060ee6ee239	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	34220 ef91115155c82eb63f1a40035f165a3d5e50547b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	159249		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Notice of Allowability	Application No. 12/304,653	Applicant(s) FINKENZELLER ET AL.	
	Examiner ANDREW BEE	Art Unit 2689	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *reply filed 7/5/2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *13, 15-23, and 37-48; renumbered 1-22 by the examiner*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

23364 7590 07/12/2013

BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

EXAMINER
BEE, ANDREW W.

ART UNIT	PAPER NUMBER
2689	

DATE MAILED: 07/12/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/TJM/TL	7360

TITLE OF INVENTION: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	10/15/2013

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23364 7590 07/12/2013
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/TJM/TL	7360

TITLE OF INVENTION: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	10/15/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BEE, ANDREW W.	2689	340-010410

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

PTOL-85 (Rev. 02/11)

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29	NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27	NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.	NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/TJM/TL	7360

23364 7590 07/12/2013

BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

EXAMINER	
BEE, ANDREW W.	

ART UNIT	PAPER NUMBER
2689	

DATE MAILED: 07/12/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 777 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 777 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/304,653	FINKENZELLER ET AL.	
	Examiner	Art Unit	
	ANDREW BEE	2689	

All participants (applicant, applicant's representative, PTO personnel):

(1) *ANDREW BEE*. (3)_____.

(2) *Thomas Lee*. (4)_____.

Date of Interview: *10 July 2013*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☒112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *19 and 23*.

Identification of prior art discussed: *of record*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

We discussed an examiner's amendment to correct lack of antecedent basis issues in both claims 19 and 23 that were present to change in dependency of the claims. It was agreed to include limitations from claim 1 dated 11/30/2012 in each of claims 19 and 23 to correct the issue .

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Thomas Lee on 7/10/2013.

The application has been amended as follows:

Please amend claims 19 and 23 as follows:

19. (Currently amended) The method according to claim 18, wherein the first communication-readiness signal is generated for a first group of applications comprising the first application, and the first identification number is assigned to each of the applications in the first group, and the second communication-readiness signal is generated for a second group of applications comprising the second application, and the second identification number is assigned to each of the applications in the second group, the first communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the first group, and the second communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the second group; and

wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information; and wherein upon addressing, the session number is linked on the data carrier additionally with the additional selection information assigned to the selected application.

23. (Currently Amended) A method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier, comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application, and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application,

wherein the reading device interprets the identification numbers as identification numbers of different data carriers, and

wherein the first communication-readiness signal is generated for a first group of applications comprising the first application, and the first identification number is assigned to each of the applications in the first group, and the second communication-readiness signal is generated for a second group of applications comprising the second application, and the second identification number is assigned to each of the applications in the second group, the first communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the first group, and the second communication-readiness signal

indicating to the reading device the communication readiness of each of the applications of the second group; and

wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information; and wherein the data carrier generates the additional selection information as a virtual sector assignment and the reading device interprets the additional selection information as a sector assignment of a memory area of one of the different data carriers, whereas the different data carriers may be emulated data carriers.

Reasons for Allowance

2. The following is an examiner's statement of reasons for allowance: There is no reasonable combination of references sufficient to teach the combinations of limitations of each claim. Although the limitations directed to the at least two applications on a portable data carrier and the generating of communication-readiness signals for each application, as presented in the independent claims is taught in the prior art (see rejections dated 9/05/2012 and 1/18/2013); these limitations in combination with the additional limitations of each independent claim, as presented in each independent claim, are not taught by the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW BEE whose telephone number is (571)270-5183. The examiner can normally be reached on Monday-Thursday 8am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Mehmood can be reached on (571)272-2976. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANDREW BEE/
Examiner, Art Unit 2689

/Jennifer Mehmood/
Supervisory Patent Examiner, Art Unit 2689

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	**Art Unit**
	ANDREW BEE	2689

CPC		
Symbol	**Type**	**Version**

CPC Combination Sets				
Symbol	**Type**	**Set**	**Ranking**	**Version**

/ANDREW BEE/ Examiner.Art Unit 2689	7/10/2013	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/JENNIFER MEHMOOD/ Supervisory Patent Examiner.Art Unit 2689	07/10/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	**Art Unit**
	ANDREW BEE	2689

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
340	10.41	H	0	4	Q	5 / 22 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											
340	10.1	10.2	10.4	10.42								

/ANDREW BEE/ Examiner.Art Unit 2689	7/10/2013	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/JENNIFER MEHMOOD/ Supervisory Patent Examiner.Art Unit 2689	07/10/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	**Art Unit**
	ANDREW BEE	2689

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	4	17	-	33										
-	2	5	18	-	34										
-	3	6	19	-	35										
-	4	7	20	-	36										
-	5	8	21	11	37										
-	6	9	22	12	38										
-	7	10	23	13	39										
-	8	-	24	14	40										
-	9	-	25	15	41										
-	10	-	26	18	42										
-	11	-	27	16	43										
-	12	-	28	19	44										
1	13	-	29	17	45										
-	14	-	30	20	46										
2	15	-	31	21	47										
3	16	-	32	22	48										

/ANDREW BEE/ Examiner.Art Unit 2689	7/10/2013	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	22	
/JENNIFER MEHMOOD/ Supervisory Patent Examiner.Art Unit 2689	07/10/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

OK TO ENTER: /A.B./

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Application No.:	12/304,653	**Confirm. No.:**	7360
Filing Date:	March 4, 2009	**Art Unit:**	2689
First Inventor:	Klaus FINKENZELLER	**Customer No.:**	23364
Attorney No.:	FINK3009/TJM/TL	**Examiner:**	Andrew W. Bee
For:	**DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER**		

REPLY UNDER 37 C.F.R. § 1.116 TO OFFICE ACTION OF JANUARY 18, 2013

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

This is responsive to the Office Action dated January 18, 2013 in the above application wherein claims 1, 3-12, 14, 17-22, 24, 26-36, 39-41, 43, and 45 are finally rejected.

In view of the following amendments and remarks, reconsideration of the application is respectfully requested.

A petition and appropriate fee to extend the period of reply by three months are concurrently filed herewith.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	53	(FINKENZELLER-KLAUS FINKENZELLER-K$3 (FINKENZELLER near3 KLAUS) HARTEL-KARL HARTEL-K$3 (HARTEL near3 KARL) BRANDL-DENNY BRANDL-D$3 (BRANDL near3 DENNY)).in.	US-PGPUB; USPAT	OR	ON	2013/07/10 10:54
L2	4	L1 and ((interrogat$4 scan$4 read reader reading) and application).clm.	US-PGPUB; USPAT	OR	ON	2013/07/10 10:54
L3	7474	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2013/07/10 10:56
L4	466	L3 and ((two many multiple least more) near2 application near5 (data adj carrier tag transponder))	US-PGPUB; USPAT	OR	ON	2013/07/10 10:56
L5	188	L3 and (((two many multiple least more) near2 application near5 (data adj carrier tag transponder)) same (id identif$5 identification))	US-PGPUB; USPAT	OR	ON	2013/07/10 10:57
L6	34	3 and (emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2013/07/10 10:58
S1	45	(FINKENZELLER-KLAUS FINKENZELLER-K$3 (FINKENZELLER near3 KLAUS) HARTEL-KARL HARTEL-K$3 (HARTEL near3 KARL) BRANDL-DENNY BRANDL-D$3 (BRANDL near3 DENNY)).in.	US-PGPUB; USPAT	OR	ON	2012/08/24 10:22
S2	4	S1 and ((interrogat$4 scan$4 read reader reading) and application).clm.	US-PGPUB; USPAT	OR	ON	2012/08/24 10:22
S3	2	("20070274242" "20040199784").pn.	US-PGPUB; USPAT	OR	ON	2012/08/24 11:02
S4	3	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$).did.	US-PGPUB	OR	ON	2012/08/27 10:19
S6	2	S4 and emulat$4	US-PGPUB; USPAT	OR	ON	2012/08/27 10:20
S7	663	(emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 15:42
S8	8552	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/27 15:43
S9	31	S8 and S7	US-PGPUB; USPAT	OR	ON	2012/08/27 15:43
S10	53	(emulat$4 simulat$4) near5 (group) near5	US-	OR	ON	2012/08/27

		(rf$2id tag transponder carrier card smart$2card)	PGPUB; USPAT			16:00
S11	149	(emulat$4 simulat$4) near5 (group) near5 (tag transponder application card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:03
S12	1	S8 and S11	US-PGPUB; USPAT	OR	ON	2012/08/27 16:03
S13	15	(single one individual) near10 (emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:33
S14	15	(single one individual data adj carrier) near10 (emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:33
S15	0	(single one individual parent) near2 ticket near10 (emulat$4 simulat$4) near5 (group family child$3) near5 (ticket)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:36
S16	6679	(emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:37
S17	226	S8 and S16	US-PGPUB; USPAT	OR	ON	2012/08/27 16:38
S18	2441	(single one individual parent) near10 (emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:38
S19	1874	(single one individual parent) near10 (emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near2 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:39
S20	71	S8 and S19	US-PGPUB; USPAT	OR	ON	2012/08/27 16:39
S21	6742	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S22	63	S21 and S19	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S23	53	S22 not S9	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S25	2015	(rf$2id tag transponder) near10 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 07:20
S26	3	S25 and (simulat$4 emulat$4) near3 (plural$4 multipl$5 many several) near3 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:21
S27	76	S25 and (ticket) near20 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S28	123	(rf$2id tag transponder) near5 (send$3 transmit$4 communicat$4) near5 (group	US-PGPUB;	OR	ON	2012/08/28 07:23

		near2 (id identification identi$6))	USPAT			
S29	0	S28 and (ticket) near20 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S30	6758	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 07:24
S31	31	S30 and S28	US-PGPUB; USPAT	OR	ON	2012/08/28 07:24
S32	156	(rf$2id tag transponder card smart$2card ic chip) near5 (send$3 transmit$4 communicat$4) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:09
S34	32	S30 and S32	US-PGPUB; USPAT	OR	ON	2012/08/28 08:09
S35	1	S34 not S31	US-PGPUB; USPAT	OR	ON	2012/08/28 08:10
S36	1708	(rf$2id tag transponder) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:10
S38	138	S30 and S36	US-PGPUB; USPAT	OR	ON	2012/08/28 08:11
S39	156	(rf$2id tag transponder) near5 (group near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:11
S40	10	S30 and S39	US-PGPUB; USPAT	OR	ON	2012/08/28 08:12
S41	0	(rf$2id tag transponder) near5 (pre$2amble header) same (group near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:34
S42	304	(rf$2id tag transponder) near5 ((lot type group) near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S43	31	S30 and S42	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S44	21	S43 not S40	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S45	547	(rf$2id tag transponder) near5 (group near2 id)	US-PGPUB; USPAT	OR	ON	2012/08/28 08:41
S46	31	S30 and S45	US-PGPUB; USPAT	OR	ON	2012/08/28 08:41
S47	333	(rf$2id tag transponder) near5 ((lot type group) near2 (id identification identi$6 code)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52

S48	37	S30 and S47	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S49	6	S48 not S43	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S50	766	(rf$2id tag transponder) near5 (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:53
S51	48	S30 and S50	US-PGPUB; USPAT	OR	ON	2012/08/28 08:54
S52	17	S51 not S46	US-PGPUB; USPAT	OR	ON	2012/08/28 08:54
S53	110	(rf$2id tag transponder) near20 (send$4 transmit$4 communicat$4 signal$4) near5 (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S54	8569	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S55	24	S54 and S53	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S56	1791	(340/10.4-10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 09:00
S57	36	S56 and (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:01
S58	32	S57 and (rf rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 09:01
S59	397	(rf$2id tag transponder) near5 (group adj(code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S60	2	S56 and S59	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S61	23	S54 and S59	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S62	5	(rf$2id tag transponder) near20 (group adj (code id)) near10 ((individual unique) adj (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:08
S63	13	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$ or US-20090243810-$ or US-20060181420-$ or US-20050253687-$ or US-20050258956-$ or US-20020175805-$ or US-20060145817-$ or US-20080109899-$ or US-20050066039-$).did. or (US-7307533-$ or US-5856788-$).did.	US-PGPUB; USPAT	OR	ON	2012/08/29 08:31
S65	12	S63 and (ident$7 identification id) near3 number	US-PGPUB; USPAT	OR	ON	2012/08/29 08:31
S66	4	S63 and (reader read reading interrogat$4) near10 search$4	US-PGPUB;	OR	ON	2012/08/29 08:47

			USPAT			
S67	13	S63 and (reader read reading interrogat$4) near10 (signal$4 command transmit$4 send$4 communicat$4 search$4)	US-PGPUB; USPAT	OR	ON	2012/08/29 08:49
S68	13	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$ or US-20090243810-$ or US-20060181420-$ or US-20050253687-$ or US-20050258956-$ or US-20020175805-$ or US-20060145817-$ or US-20080109899-$ or US-20050066039-$).did. or (US-7307533-$ or US-5856788-$).did.	US-PGPUB; USPAT	OR	ON	2012/08/29 11:39
S69	11	S68 and group	US-PGPUB; USPAT	OR	ON	2012/08/29 11:39
S70	473	(rf$2id tag transponder) near10 (stor$3 record$4 writ$4) near5 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/29 13:11
S71	445	(read reading communication transmit$4 transmission send) near5 order near20 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/29 13:12
S72	7	S70 and S71	US-PGPUB; USPAT	OR	ON	2012/08/29 13:12
S73	445	(read reading communication transmit$4 transmission send) near5 order near20 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/30 06:51
S74	501	(rf$2id tag transponder) near5 (stor$3 record$4 writ$4) near5 (time order) near5 (communicat$4 transmission transmit$4 send$4) near5 (read reader reading interrogat$4 scan$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 06:57
S75	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 06:58
S76	242	S75 and S74	US-PGPUB; USPAT	OR	ON	2012/08/30 06:58
S77	0	(stor$3 record$4 writ$4) near3 last near2 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4) near3 (read reader reading interrogat$4 scan$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:00
S78	6	(stor$3 record$4 writ$4) near3 last near2 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:00
S79	46	(stor$3 record$4 writ$4) near3 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4) near3 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:01
S80	32	S79 and history near10 (time order last)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:02
S81	11	((tag transponder) near2 (rf$2id rf)) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near3 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:11
S82	54	(tag transponder) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near2 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:12

S83	23	S75 and S82	US-PGPUB; USPAT	OR	ON	2012/08/30 07:13
S84	119	(tag transponder chip ic card smart$2card rf$2id rf label) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near2 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S85	26	S75 and S84	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S86	4	S85 not S83	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S87	27	indicat$4 near5 (tag transponder) near3 already near3 (read interrogat$4 scan$3)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:17
S88	3	S87 and indicat$4 near20 time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:24
S89	26	S87 and tim$3	US-PGPUB; USPAT	OR	ON	2012/08/30 07:24
S90	15	S87 and indicat$4 same time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:28
S91	17	S87 and (read$4 interrogat$4 scan$3) near5 time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:28
S92	0	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4) near5 session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:37
S93	4	(read reader reading interrogat$4 scan$4) near15 (assign$4 allocat$4) near5 session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:37
S94	388	(read reader reading interrogat$4 scan$4) same session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:39
S95	25	(read reader reading interrogat$4 scan$4) same session adj number near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:39
S96	29	(read reader reading interrogat$4 scan$4) near15 session adj (number id identification identif$6 token) near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:53
S97	5	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token) near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:20
S98	89	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:23
S99	11	S98 and (tag transponder card ic smart$2card chip) near10 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:24

S100	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 10:30
S101	2	S100 and S98	US-PGPUB; USPAT	OR	ON	2012/08/30 10:30
S102	97	(read reader reading interrogat$4 scan$4) near5 (address$4 assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S103	2	S100 and S102	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S104	13	S102 and (tag transponder card ic smart$2card chip) near10 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S105	2	S104 not S99	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S106	2451	contact near10 contactless$3 near10 (ticket card smart$2card tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S107	1983	contact near5 contactless$3 near5 (ticket card smart$2card tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S108	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S109	72	S108 and S107	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S110	6764	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S111	53	S110 and S107	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S112	17	contact near5 contactless$3 near5 (ticket)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:27
S113	663	(emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:59
S114	5	S113 and (memory near20 (sector))	US-PGPUB; USPAT	OR	ON	2012/08/30 14:59
S115	35	rfid adj tag near10 access near2 protect$4	US-PGPUB; USPAT	OR	ON	2012/08/30 15:13
S116	127	S113 and (plural$5 multipl$6 many) near5 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:19
S117	24	S113 same (plural$5 multipl$6 many) near5 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:19
S118	12	S113 same (plural$5 multipl$6 many) near2	US-	OR	ON	2012/08/30

		memories	PGPUB; USPAT			15:20
S119	63	S113 and (plural$5 multipl$6 many) near2 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:21
S120	3	S108 and S119	US-PGPUB; USPAT	OR	ON	2012/08/30 15:21
S121	48	(FINKENZELLER-KLAUS FINKENZELLER-K$3 (FINKENZELLER near3 KLAUS) HARTEL-KARL HARTEL-K$3 (HARTEL near3 KARL) BRANDL-DENNY BRANDL-D$3 (BRANDL near3 DENNY)).in.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:42
S122	4	S121 and ((interrogat$4 scan$4 read reader reading) and application).clm.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:42
S123	2	S121 and ((interrogat$4 scan$4 read reader reading) and application and group).clm.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:42
S124	7083	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:43
S125	0	S124 and (emulat$4 near2 (tag transponder application) near10 last near10 (read communicat$4 interrogat$4))	US-PGPUB; USPAT	OR	ON	2013/01/14 18:43
S126	0	S124 and virtual adj sector	US-PGPUB; USPAT	OR	ON	2013/01/14 18:44
S127	5	S124 and (previous$4 near2 (read$4 communicat$4 interrogat$4) near3 (log record))	US-PGPUB; USPAT	OR	ON	2013/01/14 18:45
S128	1	S124 and security same emulat$4 near2 tag	US-PGPUB; USPAT	OR	ON	2013/01/14 18:46
S129	85886	sam security near2 module secure near2 application	US-PGPUB; USPAT	OR	ON	2013/01/14 18:49
S130	72871	sam secure near2 application	US-PGPUB; USPAT	OR	ON	2013/01/14 18:49
S131	25	S130 and emulat$4 near2 (tag transponder)	US-PGPUB; USPAT	OR	ON	2013/01/14 18:50
S132	169	S124 and S129	US-PGPUB; USPAT	OR	ON	2013/01/14 18:51
S133	6	S132 and emulat$4 near2 (tag transponder)	US-PGPUB; USPAT	OR	ON	2013/01/14 18:51
S134	0	emulat$4 near2 tag same pluarl$4 near2 memor$3	US-PGPUB; USPAT	OR	ON	2013/01/14 18:53

7/ 10/ 2013 11:01:48 AM
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	Art Unit
	ANDREW BEE	2689

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
340	10.1,10.2,10.4,10.41,10.42	8/30/2012	/A.B./

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name search	8/30/2012	/A.B./
EAST search	8/30/2012	/A.B./
All searches updated	1/14/2013	/A.B./
All searches updated	7/10/2013	/A.B./
Consulted Jennifer Mehmood; SPE in class 340	7/10/2013	/A.B./

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
340	10.1,10.2,10.4,10.41,10.42	7/10/2013	/A.B./

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Application No.:	12/304,653	**Confirm. No.:**	7360
Filing Date:	March 4, 2009	**Art Unit:**	2689
First Inventor:	Klaus FINKENZELLER	**Customer No.:**	23364
Attorney No.:	FINK3009/TJM/TL	**Examiner:**	Andrew W. Bee
For:	**DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER**		

REPLY UNDER 37 C.F.R. § 1.116 TO OFFICE ACTION OF JANUARY 18, 2013

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

This is responsive to the Office Action dated January 18, 2013 in the above application wherein claims 1, 3-12, 14, 17-22, 24, 26-36, 39-41, 43, and 45 are finally rejected.

In view of the following amendments and remarks, reconsideration of the application is respectfully requested.

A petition and appropriate fee to extend the period of reply by three months are concurrently filed herewith.

AMENDMENT

Please amend the pending application in accordance with the following particulars.

In the Claims

The claims are amended as shown on the following pages under the heading LIST OF CURRENT CLAIMS. The list shows the status of all claims presently in the application and is intended to supersede all prior versions of the claims in the application. Any cancellation of claims is made without prejudice or disclaimer.

LIST OF CURRENT CLAIMS

1-12. (Canceled)

13. (Currently Amended) A method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier, comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application, and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application, and

storing information in a nonvolatile memory of the data carrier about which of the at least two applications was last selected for further communication by the reading device,

wherein the reading device selects for further communication one or more of the at least two applications via the identification numbers assigned to the applications.

14. (Canceled)

15. (Previously Presented) The method according to claim 13, wherein upon new communication of the reading device with the data carrier, a communication-readiness signal is emitted first for one of the at least two applications that is different from the application designated by the stored information.

16. (Previously Presented) The method according to claim 13, wherein, upon new communication of the reading device with the data carrier, a communication-readiness signal is emitted first for the application with which active communication was effected last.

17. (Currently Amended) The method according to claim [[7]] 13, wherein the reading device addresses an application selected for further communication via a dynamically allocated session number.

18. (Previously Presented) The method according to claim 17, wherein upon addressing, the session number is linked on the data carrier with the identification number assigned to the selected application.

19. (Previously Presented) The method according to claim 18, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information; and wherein upon addressing, the session number is linked on the data carrier additionally with the additional selection information assigned to the selected application.

20. (Currently Amended) The method according to claim [[1]] 13, wherein the data carrier recognizes by a response of the reading device to communication-readiness signals emitted by the data carrier whether the reading device is set up to resolve a collision between a plurality of applications.

21. (Currently Amended) The method according to claim [[1]] 13, wherein the reading device communicates with a plurality of the at least two applications in parallel.

22. (Currently Amended) The method according to claim [[1]] 13, wherein the reading device interprets the identification numbers as identification numbers of different data carriers.

23. (Currently Amended) ~~The method according to claim 22,~~ A method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier, comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application, and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application,

wherein the reading device interprets the identification numbers as identification numbers of different data carriers, and

wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information; and wherein the data carrier generates the additional selection information as a virtual sector assignment and the reading device interprets the additional selection information as a sector assignment of a memory area of one of the different data carriers, whereas the different data carriers may be emulated data carriers.

24-36. (Canceled)

37. (Previously Presented) A contactlessly communicating portable data carrier, comprising at least two applications stored thereon and a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the communication device is set up to store information in a nonvolatile memory of the data carrier about which of the at least two applications last communicated with a reading device.

38. (Previously Presented) The data carrier according to claim 37, wherein the communication device is set up to emit, upon new contacting of a reading device with the data carrier, a communication-readiness signal first for one of the at least two applications that is different from the application designated by the stored information.

39. (Currently Amended) The data carrier according to claim [[24]] 37, wherein the communication device is set up to recognize by a response of a reading device to communication-readiness signals emitted by the communication device whether the reading device is set up to resolve collisions between a plurality of applications.

40. (Currently Amended) The data carrier according to claim [[24]] 37, wherein the data carrier is configured as a contactlessly communicating chip card, contactlessly communicating label, contactlessly communicating identification document or as a (U)SIM mobile communication card.

41. (Currently Amended) The data carrier according to claim [[24]] 37, wherein the data carrier has a dual interface and can be operated both contactlessly and with contact.

42. (Previously Presented) A contactlessly communicating portable data carrier, comprising at least two applications stored thereon and a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the data carrier is configured as a security module in a device comprising a communication device configured for contactless communication, the security module having software configured to communicate contactlessly via the communication device of the device.

43. (Currently Amended) The data carrier according to claim [[24]] 37, including a memory which is divided into sectors, each of the sectors having no more than one of the at least two applications stored therein.

44. (Previously Presented) A contactlessly communicating portable data carrier comprising:

a memory which is divided into sectors,

at least two applications stored on said memory, wherein each of the sectors have no more than one of the at least two applications stored therein, and

a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the communication device is set up to assign additional selection information to each of the applications of a group of applications; and

wherein the communication device is set up to assign the at least two applications the additional selection information in the form of a virtual sector assignment and to generate communication-readiness signals for the group of applications, the groups in each case comprising applications with pairwise different virtual sector assignments.

45. (Previously Presented) The data carrier according to claim 43, wherein each of the sectors is access-protected separately for access by a reading device to applications stored in said sectors.

46. (Previously Presented) A contactlessly communicating portable data carrier, comprising at least two applications stored thereon and a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the data carrier is configured as an electronic device with a contactless interface for communication with a reading device and with a plurality of memories, each of the memories having no more than one of the at least two applications stored therein in each case.

47. (Previously Presented) The data carrier according to claim 46, wherein the contactless interface is configured as an NFC interface and the data carrier is set up to be operated in the passive mode for communication with a reading device.

48. (Previously Presented) The data carrier according to claim 46, wherein the memories are formed on chip cards, in particular (U)SIM mobile communication cards, secure digital memory cards or EMV payment cards, integrated into the data carrier.

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the claims

A. Claim Amendments

Claims 1, 3-12, 14, 24, 26-36 are canceled without prejudice or disclaimer.

Claim 13 is amended to include the subject matter of previously intervening claim 7, which was inadvertently not included on page 10 of the reply filed November 30, 2012.

Claim 23 is rewritten in independent form including the limitations of original base claim 1 and intervening claim 22, where claim 23 conforms to the allowable subject matter as indicated in item 15 of the Office Action dated September 5, 2012.

Claims 17, 20-22, 39-41, and 43 are amended to change the dependency from a now canceled claim.

Claims 15-16, 18-19, 37-38, 42, and 44-46 are left unchanged.

B. Claim Objections

This rejection is moot in view of the cancelation of claim 3.

Accordingly, withdrawal of this objection is requested.

2. Rejection of claims 31-32 under 35 U.S.C. § 112, second paragraph

This rejection is moot in view of the cancelation of claims 31-32.

Accordingly, withdrawal of this rejection is respectfully requested.

3. Allowable Subject Matter

Applicants are gratefully appreciative of the indications that claims 13, 15-16, 37-38, 42, 44, and 46-48 are allowed and claim 23 is allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In view

of the allowable subject matter, claim 13 and 37 are presented in independent form and the remaining independent claims canceled.

4. Rejection of claims 1, 3-12, 20-22, 24, 26-29, 33-36, and 39-40 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*)

This rejection is moot in view of the cancelation of claims 1, 3-12, 24, 26-29, and 33-36 and the change in dependency of claims 20-22 and 39-40 to allowable claims 13 and 37, respectively.

Accordingly, withdrawal of this rejection is requested.

5. Rejection of claim 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*) and further in view of U.S. publication 2006/0065731 (*Powell et al.*)

This rejection is moot in view of the cancelation of the claim.

Accordingly, withdrawal of this rejection is requested.

6. Rejection of claims 17-19 and 30-32 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*) and further in view of U.S. patent 6,421,196 (*Takayama et al.*)

This rejection is moot in view of the cancelation of claims 30-32 and the change in dependency of claims 17-19 to allowable claim 13.

Accordingly, withdrawal of this rejection is requested.

7. Rejection of claim 41 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*) and further in view of U.S. publication 2006/0206343 (*Nakanishi et al.*)

This rejection is moot in view of the change in dependency of claim 41 to allowable claim 37.

Accordingly, withdrawal of this rejection is requested.

8. Rejection of claim 43 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*)

This rejection is moot in view of the change in dependency of claim 43 to allowable claim 37.

Accordingly, withdrawal of this rejection is requested.

9. Rejection of claim 45 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*) and further in view of U.S. publication 2006/0007236 (*Lane et al.*)

This rejection is moot in view of the change in dependency of claim 43 to allowable claim 37, from which claim 45 depends.

Accordingly, withdrawal of this rejection is requested.

10. Conclusion

As a result of the amendments to the claims and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is requested that the currently presented claims be approved and the application passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

BACON & THOMAS, PLLC
625 Slaters Lane, Fourth Floor
Alexandria, Virginia 22314-1176
Phone: (703) 683-0500
Facsimile: (703) 683-1080

Date: July 5, 2013

Respectfully submitted,

/ Thomas J. Moore /

THOMAS J. MOORE
Attorney for Applicants
Registration No. 28,974

PTO/AIA/22 (03-13)
Approved for use through 3/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): FINK3009/TJM/TL

Application Number: 12/304,653

Filed: March 4, 2009

For: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

Art Unit: 2689

Examiner: Andrew W. Bee

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 1400
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 02-0200.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 28,974.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Thomas J. Moore/ — Signature

July 5, 2013 — Date

THOMAS J. MOORE — Typed or printed name

703-683-0500 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	12304653
Filing Date:	04-Mar-2009
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Filer:	Thomas J. Moore/Kaitlyn Miller
Attorney Docket Number:	FINK3009/TJM/TL

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with $0 paid	1253	1	1400	1400

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**1400**

Electronic Acknowledgement Receipt

EFS ID:	16242237
Application Number:	12304653
International Application Number:	
Confirmation Number:	7360
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	FINK3009/TJM/TL
Receipt Date:	05-JUL-2013
Filing Date:	04-MAR-2009
Time Stamp:	15:43:25
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1400
RAM confirmation Number	1127
Deposit Account	020200
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		FINK3009_foa_18JAN13_116_rpsns.pdf	172642 274fb9c142abc30afc9d2871f799be6fc0a5381b	yes	13

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Response After Final Action	1	2
Claims	3	9
Applicant Arguments/Remarks Made in an Amendment	10	13

Warnings:

Information:

2	Extension of Time	FINK3009_EOT.pdf	156990 1e7beb59295c34fc4675e7c4bf7b46e4b602d7d9	no	2

Warnings:

Information:

3	Fee Worksheet (SB06)	fee-info.pdf	30666 4c760072e4cd2fa823a21fdef6c3184b6053cbe4	no	2

Warnings:

Information:

Total Files Size (in bytes):	360298

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/304,653	Filing Date 03/04/2009	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **07/05/2013**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 22	Minus	** 48	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 6	Minus	***7	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/DENISE HOPKINS/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/JEK/TL	7360

23364 7590 01/18/2013

BACON & THOMAS, PLLC
625 SLATERS LANE
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ALEXANDRIA, VA 22314-1176

EXAMINER	
BEE, ANDREW W.	
ART UNIT	**PAPER NUMBER**
2689	

MAIL DATE	DELIVERY MODE
01/18/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/304,653	FINKENZELLER ET AL.	
	Examiner	Art Unit	
	ANDREW BEE	2689	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2012*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1,3-24 and 26-48* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☒ Claim(s) *13,15,16,37,38,42,44 and 46-48* is/are allowed.

7)☒ Claim(s) *1,3-12,14,17-22,24,26-36,39-41,43 and 45* is/are rejected.

8)☒ Claim(s) *23* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *30 November 2012* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Response to Amendment

1. This Office action is in response to reply filed 11/30/2012. Claims 1, 3, 5, 8, 13, 18-19, 23-24, 26, 32, 37, 42-44, and 46 have been amended and claims 2 and 25 have been canceled. Claims 1, 3-24, and 26-48 are currently pending in the application.

Claim Objections

2. Claim 3 is objected to because of the following informalities: Claim 3 is dependent on itself; it appears claim 3 should depend on claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of 35 U.S.C. 112(b):

(B) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 31 and 32 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claims 31 and 32 recite “the application”. Multiple applications have been identified, thus it is unclear which application is being referred to by "the application". A suggested amendment to provide clarity to the claim is to recite "the addressed application" for each instance.

Claims 32 recites "the group of applications". A first and second group of applications have previously been identified in the claim, thus it is unclear which group of applications is being referred to by "the group of applications".

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-12, 20-22, 24, 26-29, 33-36, and 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft et al. (US 2007/0274242) in view of Rijnswou Van et al. (US 2008/0109899).

As per claim 1, Lamacraft teaches a method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier (para. 0010-0011 and 0016: Communication between RFID devices and readers is contactless; the multiple emulated RFID tags in the single RFID device are the communication-ready applications) comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application (para. 0019 and 0136: Identifiers for each of the emulated tags are sent to the reader; thus an identifier, which is an identification number, for a first emulated tag is sent to the reader; the sending of identifiers indicates

communication readiness of each of the emulated tags because the ability to receive a reader signal and respond to the reader signals is an indication of communication readiness), and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application (para. 0019 and 0136: Identifiers for each of the emulated tags are sent to the reader; thus an identifier, which is an identification number, for a second emulated tag is sent to the reader; the sending of identifiers indicates communication readiness of each of the emulated tags because the ability to receive a reader signal and respond to the reader signals is an indication of communication readiness; the identifiers are different for each emulated tag),

Lamacraft does not disclose:

wherein the first communication-readiness signal is generated for a first group of applications comprising the first application, and the first identification number is assigned to each of the applications in the first group, and the second communication-readiness signal is generated for a second group of applications comprising the second application, and the second identification number is assigned to each of the applications in the second group, the first communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the first group, and the second communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the second group.

However, in the same art of potable data carriers, Rijnswou Van teaches that ID tags may have group IDs to identify the tags as part of a group (Rijnswou Van, para. 0011).

Furthermore, Lamacraft's teaching of multiple emulated tags of varying types suggests that there are reasonably multiple emulated tags of each type (Lamacraft, para. 0134 and 0137).

Thus, in this combination, for Lamacraft's reader to read only a specific type of tag, for example, only read the emulated tags representing public transport tickets, the emulated tags would need some sort of group ID identifying which type of tag they are. Thus, Lamacraft's tags would include group IDs to identify each tag of the same type. Therefore, the group IDs for each type are the identification number for each group and at least part of the communication-readiness signals for each group.

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft's emulated tags of different types to include group IDs to identify which type of tag they are, as taught by Rijnswou Van. The motivation is because the type of tag identification will assist the reader in only reading the specific type of tag desired, and reading all of the same specific type of tag. Group IDs as part of tag identification is well known and commonly used in the data carrier art. Thus, the combination with Rijnswou Van not only provides the expected resulting benefit of allowing a reader for a specific event to read only the emulated tags relating to that event, such as transport tickets, but the group IDs will also assist in limiting the number of emulated tags that need to be read as those emulated tags not relating to a specific event will not be read.

As per claim 3 (dependent on claim *1*), Lamacraft in view of Rijnswou Van further teaches:

wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information (Rijnswou Van, para. 0011: Each tag has additional data to be uniquely identified even from the group; thus in this combination Lamacraft's reader can uniquely identify single emulated tags from tag groups in order to communicate with single emulated tags).

As per claim 4 (dependent on claim 1), Lamacraft in view of Rijnswou Van further teaches:

wherein the reading device emits search signals, the signals generated for the applications comprising response signals to the search signals (Lamacraft, fig. 25a and para. 0125-0128: The reader emits RF and modulated RF signals without knowing what tags are present; the tags that happen to be present respond to the reader's signals; thus the initial RF and modulated RF signals are considered search signals).

As per claim 5 (dependent on claim 1), Lamacraft in view of Rijnswou Van further teaches:

including the further step of toggling between the applications for communication of a selected application with the reading device (Lamacraft, para. 0116 and 0128: The communicating for different emulated tags in different time slots is toggling between the emulated tags, or different applications).

As per claim 6 (dependent on claim 5), Lamacraft in view of Rijnswou Van further teaches:

wherein toggling is effected by branching or by context switching (Lamacraft, para. 0116 and 0128: The switching between emulated tags can be considered branching or context switching).

As per claim 7 (dependent on claim 1), Lamacraft in view of Rijnswou Van further teaches:

wherein the reading device selects for further communication one or more of the at least two applications via the identification numbers assigned to the applications (Lamacraft, para. 0136-0138: The reader identifies each emulated tag and selects an emulated tag for further communication; the selection is based on what type of tag the emulated tag represents, thus is based on the tag identifier).

As per claim 8, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 7, plus the consideration of claim 3 above. The selection of a single tag to communicate with in this combination is based on the group ID and the additional identification for uniquely identifying each tag.

As per claim 9 (dependent on claim 7), Lamacraft in view of Rijnswou Van further teaches:

wherein for one or more of the at least two applications that have not yet been selected for further communication by the reading device, the communication-readiness signal is generated while the communication with one or more others of the at least two applications that have been selected for further communication by the reading device is not yet completed (Lamacraft, para. 0136-0138: When a reader is for reading a certain type of tag, such as a train ticket, as the reader identifies tags as train tickets, the tags are selected for further

communication; identification from other tags may still be incoming to the reader, thus at least one tag that has not yet been selected for further communication may be sending identifier data while the reader is not yet done communicating with an already selected tag).

As per claim 10 (dependent on claim 7), Lamacraft in view of Rijnswou Van further teaches:

wherein for one or more of the at least two applications that have not yet been selected for further communication by the reading device, the communication-readiness signal is generated after one or more others of the at least two applications have been suspended after completion of communication with the reading device (Lamacraft, para. 0136-0138: When the reader is for reading a specific type of tag, it will identify and read that type of tag and then end communication, the reader may then be interested in a different type of tag and thus initiate communication with the emulated tag again; in this case the tags, including those not previously selected for further communication, will have their identifiers sent to the reader).

As per claim 11 (dependent on claim 7), Lamacraft in view of Rijnswou Van further teaches:

wherein the data carrier informs the reading device by means of collision signals that one or more of the at least two applications that have not yet been selected for further communication by the reading device are present by signals being sent that simulate a collision between a plurality of applications (Lamacraft, para. 0130 and 1036-0138: The RFID device may emulate a collision between tags so that the reader recognizes that a plurality of tags need to communicate and initiates collision protocols).

As per claim 12 (dependent on claim 7), Lamacraft in view of Rijnswou Van further teaches:

wherein the data carrier informs the reading device by means of an allocation of one or more time slots that one or more of the at least two applications that have not yet been selected for further communication by the reading device are present (Lamacraft, fig. 23 and para. 0116: The RFID device may cause emulated tag identifiers to be communicated in time slots so the reader can receive the data for each emulated tag).

As per claim 20 (dependent on claim 1), Lamacraft in view of Rijnswou Van further teaches:

wherein the data carrier recognizes by a response of the reading device to communication-readiness signals emitted by the data carrier whether the reading device is set up to resolve a collision between a plurality of applications (Lamacraft, fig. 25 and para. 0129-0130: Based on the response of the reader to emulated collisions, the RFID device will recognize that the reader can handle data collisions).

As per claim 21 (dependent on claim 1), Lamacraft in view of Rijnswou Van further teaches:

wherein the reading device communicates with a plurality of the at least two applications in parallel (Lamacraft, para. 0136-0138: The reader can communicate with multiple emulated tags in parallel through data collision protocols and time slotting).

As per claim 22 (dependent on claim 1), Lamacraft in view of Rijnswou Van further teaches:

wherein the reading device interprets the identification as identification numbers of different data carriers (Lamacraft, para. 0011: To the reader the emulated tags appear as actual separate tags).

As per claim 24, Lamacraft in view of Rijnswou Van renders obvious all the claim limitations as in the consideration of claim 1 above since the components of claim 24 are the apparatus for performing the method considered in claim 1.

As per claim 26, Lamacraft in view of Rijnswou renders obvious the limitations of claim 24, plus the consideration of claim 3 above. The control, or communication device, for the tag emulation stores the tag data, and thus adds the further identification for each tag to uniquely identify each tag in a group.

As per claim 27, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 24, plus the consideration of claim 4 above.

As per claim 28, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 24, plus the consideration of claim 5 above.

As per claim 29, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 24, plus the consideration of claim 6 above.

As per claim 33 (dependent on claim 24), Lamacraft in view of Rijnswou Van further teaches:

wherein the communication device is set up to determine those applications among the at least two applications that are ready for communication with a reading device (Lamacraft, fig. 25 and para. 0128: The RFID device determines which emulated tags can respond to the reader protocol; the tags that can respond to the reader protocol are those ready for communication).

As per claim 34, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 33, plus the consideration of claim 9 above.

As per claim 35, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 33, plus the consideration of claim 10 above.

As per claim 36, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 24, plus the consideration of claim 11 above.

As per claim 39, Lamacraft in view of Rijnswou Van renders obvious the claim limitations of claim 24, plus the consideration of claim 20 above.

As per claim 40 (dependent on claim 24), Lamacraft in view of Rijnswou Van further teaches:

wherein the data carrier is configured as a contactlessly communicating chip card, contactlessly communicating label, contactlessly communicating identification document or as a (U)SIM mobile communication card (Lamacraft, para. 0027: The RFID device could be a transport ticket, thus being a contactlessly communicating chip card or label).

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Rijnswou Van and further in view of Powell et al. (US 2006/0065731).

As per claim 14 (dependent on claim 7), Lamacraft in view of Rijnswou Van does not disclose:

the further step of storing information in a nonvolatile memory of the data carrier about which of the at least two applications has already completed active communication with the reading device.

However, in the same art of reading data carriers, Powell teaches that RFID tags may include a flag that is set to indicate whether the tag has already been read, or completed active communication with the reader (Powell, para. 0061 and 0069);

Thus, in this combination, each of Lamacraft's emulated tags would include a flag to be set indicating if the emulated tag has already been read. The read flags would reasonably be stored in the RFID devices nonvolatile memory.

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft in view of Rijnswou Van's RFID to include information about which emulated tags have already been read, as taught by Powell. The motivation is to provide the reader a way to only read tags that have not already been read (Powell, para. 0061), thus eliminating redundant reads and assisting to provide a more efficient system.

8. Claims 17-19 and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Rijnswou Van and further in view of Takayama et al. (US 6,421,196).

As per claim 17 (dependent on claim 7), Lamacraft in view of Rijnswou Van does not disclose:

wherein the reading device addresses an application selected for further communication via a dynamically allocated session number.

However, in the same art of reading data carriers, Takayama teaches:

wherein the reading device addresses an application selected for further communication via a dynamically allocated session number (Takayama, col. 15 line 60-col. 16 line 13: The library controller, which is the reader, gives a session identifier, or number, to the remote memory chip, or application; for further communication, the library controller addresses the

remote memory chip using the session identifier; the session identifier is dynamically allocated because the library controller gives session identifiers as each remote memory chip is identified).

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft in view of Rijnswou Van's reader to assign session identifiers to the emulated tags, as taught by Takayama. The motivation is that a session identifier can be used to identify a tag in place of the tags normal identification. The session identifier is much shorter in length and thus more efficient and effective for communication and identification (Takayama, col. 16 lines 6-13). It is reasonable for Lamacraft's emulated tags to be treated as actual tags, including receiving session numbers, because Lamacraft's emulated tags represent actual tags.

As per claim 18 (dependent on claim 17), Lamacraft in view of Rijnswou Van and Takayama further teaches:

wherein upon addressing, the session number is linked on the data carrier with the identification number assigned to the application (Takayama, col. 15 line 60-col. 16 line 13 and Lamacraft, para. 0010-0011: Since Lamacraft's emulated tag information is on the single RIFD device, the session numbers of Takayama from the reader would have to be linked to the correct identification for each emulated tag of Lamacraft's).

As per claim 19, Lamacraft in view of Rijnswou Van and Takayama renders obvious the limitations of claim 18, plus the consideration from claim 2 above. The tags can be groups of tags with group IDs, and additional information to uniquely identify individual tags can be included, thus the session numbers assigned to each tag will be linked to the group ID and further information for each emulated tag.

As per claim 30, Lamacraft in view of Rijnswou Van renders obvious the limitations of claim 24 and further limitations are met by Lamacraft in view of Rijnswou Van and further in view of Takayama as in the consideration of claim 17 above since Lamacraft's RFID device would use the session number to identify the emulated tag to communicate with the reader.

As per claim 31, Lamacraft in view of Rijnswou Van and Takayama renders obvious the limitations of claim 30, plus the consideration of claim 18 above.

As per claim 32, Lamacraft in view of Rijnswou Van and Takayama renders obvious the limitations of claim 31, plus the consideration of claim 19 above.

9. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Nakanishi et al. (US 2006/0206343).

As per claim 41 (dependent on claim 24), Lamacraft in view of Rijnswou Van does not disclose:

wherein the data carrier has a dual interface and can be operated both contactlessly and with contact.

However, in the same art of data carriers, Nakanishi teaches:

wherein the data carrier has a dual interface and can be operated both contactlessly and with contact (Nakanishi, para. 0038-0040: The card, which is the data carrier, is used for ticketing, and has both contact and contactless interface for operation).

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft in view of Rijnswou Van's RFID device to have both contact and contactless interface for operation, as taught by Nakanishi. The motivation is to provide more

communication options and provide for more efficient communication because both the contact and contactless communication can be performed (Nakanishi, para. 0038-0040).

10. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Rijnswou Van.

As per claim 43 (dependent on claim 24), Lamacraft in view of Rijnswou Van does not necessarily disclose:

including a memory which is divided into sectors each of the sectors having no more than one of the at least two applications stored therein in each case.

However, Lamacraft in view of Rijnswou Van's emulated tag information must be stored somewhere in memory, and it is reasonable that each emulated tag would be stored in a separate memory location as this would be one of the available and known options for storing the emulated tag information. The separate locations for each emulated tag can be considered memory sectors, thus each emulated tag would be stored in a separate sector.

11. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Rijnswou Van and further in view of Lane et al. (US 2005/0007236).

As per claim 45 (dependent on claim 43), Lamacraft in view of Rijnswou Van does not necessarily disclose:

wherein each of the sectors is access-protected separately for access by a reading device to applications stored in said sectors.

However, in the same art of data carriers, Lane teaches:

access protecting data on RFID tags (Lane, para. 0025);

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft in view of Rijnswou Van's emulated tags to have access protection, as taught by Lane. The motivation is because access protecting tags is well known in the art of data carriers. It is very common for tags to have access protection that requires a password, encryption, or some other key from the reader. Access protection is known for preventing fraudulent reading or modifying of tag data. Thus, in the case of Lamacraft's emulated tags, it is reasonable that there would access protection for each emulated tag, as the information each emulated tag represents can be sensitive and a user may desire limited access for reading and modifying the stored data.

Allowable Subject Matter

12. Claims 13, 15-16, 37-38, 42, 44, and 46-48 are allowed.

13. Claim 23 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: There is no reasonable combination of references to teach the limitations of each of the indicated allowable claims. Although many of the limitations in the claims can be found throughout the prior art, there is insufficient motivation to combine the needed references to reject each claim as a whole.

Response to Arguments

14. Applicant's arguments filed 11/30/2012 have been fully considered but they are not persuasive.

The Examiner respectfully disagree with Applicant's argument that modifying the method for multi-tag emulating of Lamacraft with the teachings of Rijnswou would not have been obvious.

As noted in the above rejection of claims 1 and 24, Lamacraft teaches that the emulated tags can be used to represent a variety of types of tags, including transport tickets and patient tags for healthcare situations. Thus, it is reasonable that these different types of emulated tags would be identified differently. One known way of identifying different types of tags in the art is through group IDs for each type of tag. Rijnswou Van is relied on for the teaching that different groups of tags can have different group IDs, plus each individual tag can include individual tag serial number (Rijnswou Van, para. 0011); thus, each tag can be identified as part of a group of tags through the group ID and also uniquely through the group ID plus the individual serial number. Thus, the combination of Lamacraft and the teachings of Rijnswou Van provide the reasonably expected result of providing group identification for emulated tags through the group ID while still providing unique identification through the group ID plus the individual serial numbers. Therefore, the teachings of Rijnswou Van are reasonably combined with Lamacraft's system in order to meet the claimed invention, plus the teachings of Rijnswou Van do not change the basic operation fo Lamacraft, as the individual emulated tags can still be identified through the group ID and the individual serial numbers.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW BEE whose telephone number is (571)270-5183. The examiner can normally be reached on Monday-Thursday 8am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Mehmood can be reached on (571)272-2976. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANDREW BEE/
Examiner, Art Unit 2689

/Jennifer Mehmood/
Supervisory Patent Examiner, Art Unit 2689

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	Art Unit
	ANDREW BEE	2612

SEARCHED			
Class	Subclass	Date	Examiner
340	10.1,10.2,10.4,10.41,10.42	8/30/2012	/A.B./

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name search	8/30/2012	/A.B./
EAST search	8/30/2012	/A.B./
All searches updated	1/14/2013	/A.B./

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L5	48	(FINKENZELLER-KLAUS FINKENZELLER-K$3 (FINKENZELLER near3 KLAUS) HARTEL-KARL HARTEL-K$3 (HARTEL near3 KARL) BRANDL-DENNY BRANDL-D$3 (BRANDL near3 DENNY)).in.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:42
L6	4	L5 and ((interrogat$4 scan$4 read reader reading) and application).clm.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:42
L7	2	L5 and ((interrogat$4 scan$4 read reader reading) and application and group).clm.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:42
L8	7083	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2013/01/14 18:43
L9	0	L8 and (emulat$4 near2 (tag transponder application) near10 last near10 (read communicat$4 interrogat$4))	US-PGPUB; USPAT	OR	ON	2013/01/14 18:43
L10	0	8 and virtual adj sector	US-PGPUB; USPAT	OR	ON	2013/01/14 18:44
L11	5	L8 and (previous$4 near2 (read$4 communicat$4 interrogat$4) near3 (log record))	US-PGPUB; USPAT	OR	ON	2013/01/14 18:45
L12	1	8 and security same emulat$4 near2 tag	US-PGPUB; USPAT	OR	ON	2013/01/14 18:46
L13	85886	sam security near2 module secure near2 application	US-PGPUB; USPAT	OR	ON	2013/01/14 18:49
L14	72871	sam secure near2 application	US-PGPUB; USPAT	OR	ON	2013/01/14 18:49
L15	25	14 and emulat$4 near2 (tag transponder)	US-PGPUB; USPAT	OR	ON	2013/01/14 18:50
L16	169	8 and 13	US-PGPUB; USPAT	OR	ON	2013/01/14 18:51
L17	6	16 and emulat$4 near2 (tag transponder)	US-PGPUB; USPAT	OR	ON	2013/01/14 18:51
L18	0	emulat$4 near2 tag same pluarl$4 near2 memor$3	US-PGPUB; USPAT	OR	ON	2013/01/14 18:53
S1	45	(FINKENZELLER-KLAUS FINKENZELLER-K$3 (FINKENZELLER near3 KLAUS) HARTEL-KARL HARTEL-K$3 (HARTEL near3 KARL) BRANDL-DENNY BRANDL-D$3 (BRANDL	US-PGPUB; USPAT	OR	ON	2012/08/24 10:22

		near3 DENNY)).in.				
S2	4	S1 and ((interrogat$4 scan$4 read reader reading) and application).clm.	US-PGPUB; USPAT	OR	ON	2012/08/24 10:22
S3	2	("20070274242" "20040199784").pn.	US-PGPUB; USPAT	OR	ON	2012/08/24 11:02
S4	3	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$).did.	US-PGPUB	OR	ON	2012/08/27 10:19
S6	2	S4 and emulat$4	US-PGPUB; USPAT	OR	ON	2012/08/27 10:20
S7	663	(emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 15:42
S8	8552	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/27 15:43
S9	31	S8 and S7	US-PGPUB; USPAT	OR	ON	2012/08/27 15:43
S10	53	(emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:00
S11	149	(emulat$4 simulat$4) near5 (group) near5 (tag transponder application card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:03
S12	1	S8 and S11	US-PGPUB; USPAT	OR	ON	2012/08/27 16:03
S13	15	(single one individual) near10 (emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:33
S14	15	(single one individual data adj carrier) near10 (emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:33
S15	0	(single one individual parent) near2 ticket near10 (emulat$4 simulat$4) near5 (group family child$3) near5 (ticket)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:36
S16	6679	(emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:37
S17	226	S8 and S16	US-PGPUB; USPAT	OR	ON	2012/08/27 16:38
S18	2441	(single one individual parent) near10 (emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:38
S19	1874	(single one individual parent) near10 (emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near2 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:39

S20	71	S8 and S19	US-PGPUB; USPAT	OR	ON	2012/08/27 16:39
S21	6742	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S22	63	S21 and S19	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S23	53	S22 not S9	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S25	2015	(rf$2id tag transponder) near10 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 07:20
S26	3	S25 and (simulat$4 emulat$4) near3 (plural$4 multipl$5 many several) near3 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:21
S27	76	S25 and (ticket) near20 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S28	123	(rf$2id tag transponder) near5 (send$3 transmit$4 communicat$4) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S29	0	S28 and (ticket) near20 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S30	6758	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 07:24
S31	31	S30 and S28	US-PGPUB; USPAT	OR	ON	2012/08/28 07:24
S32	156	(rf$2id tag transponder card smart$2card ic chip) near5 (send$3 transmit$4 communicat$4) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:09
S34	32	S30 and S32	US-PGPUB; USPAT	OR	ON	2012/08/28 08:09
S35	1	S34 not S31	US-PGPUB; USPAT	OR	ON	2012/08/28 08:10
S36	1708	(rf$2id tag transponder) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:10
S38	138	S30 and S36	US-PGPUB; USPAT	OR	ON	2012/08/28 08:11
S39	156	(rf$2id tag transponder) near5 (group near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:11
S40	10	S30 and S39	US-PGPUB; USPAT	OR	ON	2012/08/28 08:12
S41	0	(rf$2id tag transponder) near5 (pre$2amble	US-	OR	ON	2012/08/28

		header) same (group near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	PGPUB; USPAT			08:34
S42	304	(rf$2id tag transponder) near5 ((lot type group) near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S43	31	S30 and S42	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S44	21	S43 not S40	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S45	547	(rf$2id tag transponder) near5 (group near2 id)	US-PGPUB; USPAT	OR	ON	2012/08/28 08:41
S46	31	S30 and S45	US-PGPUB; USPAT	OR	ON	2012/08/28 08:41
S47	333	(rf$2id tag transponder) near5 ((lot type group) near2 (id identification identi$6 code)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S48	37	S30 and S47	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S49	6	S48 not S43	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S50	766	(rf$2id tag transponder) near5 (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:53
S51	48	S30 and S50	US-PGPUB; USPAT	OR	ON	2012/08/28 08:54
S52	17	S51 not S46	US-PGPUB; USPAT	OR	ON	2012/08/28 08:54
S53	110	(rf$2id tag transponder) near20 (send$4 transmit$4 communicat$4 signal$4) near5 (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S54	8569	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S55	24	S54 and S53	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S56	1791	(340/10.4-10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 09:00
S57	36	S56 and (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:01
S58	32	S57 and (rf rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 09:01
S59	397	(rf$2id tag transponder) near5 (group	US-	OR	ON	2012/08/28

		adj(code id))	PGPUB; USPAT			09:04
S60	2	S56 and S59	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S61	23	S54 and S59	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S62	5	(rf$2id tag transponder) near20 (group adj (code id)) near10 ((individual unique) adj (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:08
S63	13	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$ or US-20090243810-$ or US-20060181420-$ or US-20050253687-$ or US-20050258956-$ or US-20020175805-$ or US-20060145817-$ or US-20080109899-$ or US-20050066039-$).did. or (US-7307533-$ or US-5856788-$).did.	US-PGPUB; USPAT	OR	ON	2012/08/29 08:31
S65	12	S63 and (ident$7 identification id) near3 number	US-PGPUB; USPAT	OR	ON	2012/08/29 08:31
S66	4	S63 and (reader read reading interrogat$4) near10 search$4	US-PGPUB; USPAT	OR	ON	2012/08/29 08:47
S67	13	S63 and (reader read reading interrogat$4) near10 (signal$4 command transmit$4 send$4 communicat$4 search$4)	US-PGPUB; USPAT	OR	ON	2012/08/29 08:49
S68	13	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$ or US-20090243810-$ or US-20060181420-$ or US-20050253687-$ or US-20050258956-$ or US-20020175805-$ or US-20060145817-$ or US-20080109899-$ or US-20050066039-$).did. or (US-7307533-$ or US-5856788-$).did.	US-PGPUB; USPAT	OR	ON	2012/08/29 11:39
S69	11	S68 and group	US-PGPUB; USPAT	OR	ON	2012/08/29 11:39
S70	473	(rf$2id tag transponder) near10 (stor$3 record$4 writ$4) near5 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/29 13:11
S71	445	(read reading communication transmit$4 transmission send) near5 order near20 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/29 13:12
S72	7	S70 and S71	US-PGPUB; USPAT	OR	ON	2012/08/29 13:12
S73	445	(read reading communication transmit$4 transmission send) near5 order near20 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/30 06:51
S74	501	(rf$2id tag transponder) near5 (stor$3 record$4 writ$4) near5 (time order) near5 (communicat$4 transmission transmit$4 send$4) near5 (read reader reading interrogat$4 scan$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 06:57
S75	8577	(340/10.1-10.6).ccls.	US-PGPUB;	OR	ON	2012/08/30 06:58

			USPAT			
S76	242	S75 and S74	US-PGPUB; USPAT	OR	ON	2012/08/30 06:58
S77	0	(stor$3 record$4 writ$4) near3 last near2 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4) near3 (read reader reading interrogat$4 scan$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:00
S78	6	(stor$3 record$4 writ$4) near3 last near2 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:00
S79	46	(stor$3 record$4 writ$4) near3 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4) near3 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:01
S80	32	S79 and history near10 (time order last)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:02
S81	11	((tag transponder) near2 (rf$2id rf)) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near3 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:11
S82	54	(tag transponder) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near2 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:12
S83	23	S75 and S82	US-PGPUB; USPAT	OR	ON	2012/08/30 07:13
S84	119	(tag transponder chip ic card smart$2card rf$2id rf label) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near2 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S85	26	S75 and S84	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S86	4	S85 not S83	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S87	27	indicat$4 near5 (tag transponder) near3 already near3 (read interrogat$4 scan$3)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:17
S88	3	S87 and indicat$4 near20 time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:24
S89	26	S87 and tim$3	US-PGPUB; USPAT	OR	ON	2012/08/30 07:24
S90	15	S87 and indicat$4 same time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:28
S91	17	S87 and (read$4 interrogat$4 scan$3) near5 time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:28
S92	0	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4) near5 session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:37
S93	4	(read reader reading interrogat$4 scan$4) near15 (assign$4 allocat$4) near5 session	US-PGPUB;	OR	ON	2012/08/30 07:37

		adj number	USPAT			
S94	388	(read reader reading interrogat$4 scan$4) same session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:39
S95	25	(read reader reading interrogat$4 scan$4) same session adj number near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:39
S96	29	(read reader reading interrogat$4 scan$4) near15 session adj (number id identification identif$6 token) near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:53
S97	5	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token) near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:20
S98	89	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:23
S99	11	S98 and (tag transponder card ic smart$2card chip) near10 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:24
S100	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 10:30
S101	2	S100 and S98	US-PGPUB; USPAT	OR	ON	2012/08/30 10:30
S102	97	(read reader reading interrogat$4 scan$4) near5 (address$4 assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S103	2	S100 and S102	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S104	13	S102 and (tag transponder card ic smart$2card chip) near10 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S105	2	S104 not S99	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S106	2451	contact near10 contactless$3 near10 (ticket card smart$2card tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S107	1983	contact near5 contactless$3 near5 (ticket card smart$2card tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S108	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S109	72	S108 and S107	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S110	6764	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-	OR	ON	2012/08/30

			PGPUB; USPAT			14:26
S111	53	S110 and S107	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
S112	17	contact near5 contactless$3 near5 (ticket)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:27
S113	663	(emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:59
S114	5	S113 and (memory near20 (sector))	US-PGPUB; USPAT	OR	ON	2012/08/30 14:59
S115	35	rfid adj tag near10 access near2 protect$4	US-PGPUB; USPAT	OR	ON	2012/08/30 15:13
S116	127	S113 and (plural$5 multipl$6 many) near5 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:19
S117	24	S113 same (plural$5 multipl$6 many) near5 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:19
S118	12	S113 same (plural$5 multipl$6 many) near2 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:20
S119	63	S113 and (plural$5 multipl$6 many) near2 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:21
S120	3	S108 and S119	US-PGPUB; USPAT	OR	ON	2012/08/30 15:21

EAST Search History (Interference)

<This search history is empty>

1/14/2013 6:53:34 PM
C:\Users\abee\Documents\EAST\Workspaces\Finkenzeller_12304653_Tag_Emulate_Plurality_Tags.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	Art Unit
	ANDREW BEE	2689

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/30/2012	01/14/2013							
	1	✓	✓							
	2	✓	✓							
	3	✓	-							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	O	=							
	14	✓	✓							
	15	O	=							
	16	O	=							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21	✓	✓							
	22	✓	✓							
	23	O	O							
	24	✓	✓							
	25	✓	-							
	26	✓	✓							
	27	✓	✓							
	28	✓	✓							
	29	✓	✓							
	30	✓	✓							
	31	✓	✓							
	32	✓	✓							
	33	✓	✓							
	34	✓	✓							
	35	✓	✓							
	36	✓	✓							

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CLAIM		DATE								
Final	Original	08/30/2012	01/14/2013							
	37	O	=							
	38	O	=							
	39	✓	✓							
	40	✓	✓							
	41	✓	✓							
	42	O	=							
	43	✓	✓							
	44	O	=							
	45	✓	✓							
	46	O	=							
	47	O	=							
	48	O	=							

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Application No.:	12/304,653	**Confirm. No.:**	7360
Filing Date:	March 4, 2009	**Art Unit:**	2612
First Inventor:	Klaus Finkenzeller	**Customer No.:**	23364
Attorney No.:	FINK3009/JEK/TL	**Examiner:**	Andrew W. Bee

For: **DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER**

REPLY UNDER 37 C.F.R. § 1.111 TO OFFICE ACTION OF SEPTEMBER 5, 2012

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

This is responsive to the Office Action dated September 5, 2012 in the above application.

In view of the following amendments and remarks, reconsideration of the application is respectfully requested.

AMENDMENT

Please amend the pending application in accordance with the following particulars.

In the Specification

An amendment to the specification is shown in the following pages under the heading AMENDMENT TO THE SPECIFICATION.

In the Abstract

An amendment to the abstract is shown in the following pages under the heading AMENDMENT TO THE ABSTRACT.

In the Drawings

An amendment to the drawings is shown in the following pages under the heading AMENDMENT TO THE DRAWINGS.

In the Claims

The claims are amended as shown on the following pages under the heading LIST OF CURRENT CLAIMS. The list shows the status of all claims presently in the application and is intended to supersede all prior versions of the claims in the application. Any cancellation of claims is made without prejudice or disclaimer.

AMENDMENT TO THE SPECIFICATION

On page 1, before paragraph [0001], insert the following header:

-- Field of Invention --

On page 1, before paragraph [0002], insert the following header:

-- Background --

On page 2, before paragraph [0010], insert the following header:

-- Summary --

On page 8, before paragraph [0033], insert the following header:

-- Brief Description of the Drawings --

On page 9, before paragraph [0034], insert the following header:

-- Detailed Description of Various Embodiments of the Disclosure --

AMENDMENT TO ABSTRACT

Amend the abstract as seen in the following marked-up abstract, a clean copy of which is attached on the following page:

~~The present invention relates to a~~ A method and ~~an accordingly set up~~ a data carrier for contactless, in particular parallel, communication of a reading device ~~(200)~~ with at least two communication-ready applications ~~(10, 20, 30)~~ located on a portable data carrier ~~(100)~~. A first communication-readiness signal is generated for a first application ~~(10, 20, 30)~~ and sent to the reading device ~~(200)~~, the signal ~~comprising~~ having a first identification number that is assigned to the first application ~~(10, 20, 30)~~ and indicates to the reading device ~~(200)~~ the communication readiness of said first application, and a second communication-readiness signal is generated and sent for a second application ~~(10, 20, 30)~~, the second signal ~~comprising~~ having a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device ~~(200)~~ the communication readiness of said second application. The identification numbers simulate for the reading device the communication readiness of a data carrier in each case. The reading device thus has the impression of communicating with applications of two separate data carriers.

ABSTRACT

A method and a data carrier for contactless, in particular parallel, communication of a reading device with at least two communication-ready applications located on a portable data carrier. A first communication-readiness signal is generated for a first application and sent to the reading device, the signal having a first identification number that is assigned to the first application and indicates to the reading device the communication readiness of said first application, and a second communication-readiness signal is generated and sent for a second application, the second signal having a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application. The identification numbers simulate for the reading device the communication readiness of a data carrier in each case. The reading device thus has the impression of communicating with applications of two separate data carriers.

AMENDMENT TO THE DRAWINGS

Replace pages 2-3 of the drawings having Figs. 2-3 with the REPLACEMENT SHEETS attached herewith for changes made to the figures.

LIST OF CURRENT CLAIMS

1. (Currently Amended) A method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier, comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application, and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application,

wherein the first communication-readiness signal is generated for a first group of applications comprising the first application, and the first identification number is assigned to each of the applications in the first group, and the second communication-readiness signal is generated for a second group of applications comprising the second application, and the second identification number is assigned to each of the applications in the second group, the first communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the first group, and the second communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the second group.

2. (Canceled)

3. (Currently Amended) The method according to claim [[2]] 3, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information ~~in each case~~.

4. (Previously Presented) The method according to claim 1, wherein the reading device emits search signals, the signals generated for the applications comprising response signals to the search signals.

5. (Currently Amended) The method according to claim 1, including the further step of toggling between the applications for communication of [[the]] a selected application with [[a]] the reading device.

6. (Previously Presented) The method according to claim 5, wherein toggling is effected by branching or by context switching.

7. (Previously Presented) The method according to claim 1, wherein the reading device selects for further communication one or more of the at least two applications via the identification numbers assigned to the applications.

8. (Currently Amended) The method according to claim 7, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information ~~in each case~~; and wherein the reading device selects for further communication one or more of the at least two applications via the identification numbers assigned to the applications and via the additional selection information assigned to the applications.

9. (Previously Presented) The method according to claim 7, wherein for one or more of the at least two applications that have not yet been selected for further communication by the reading device, the communication-readiness signal is generated while the communication with one or more others of the at least two applications that have been selected for further communication by the reading device is not yet completed.

10. (Previously Presented) The method according to claim 7, wherein for one or more of the at least two applications that have not yet been selected for further communication by the reading device, the communication-readiness signal is generated after one or more others of the at least two applications have been suspended after completion of communication with the reading device.

11. (Previously Presented) The method according to claim 7, wherein the data carrier informs the reading device by means of collision signals that one or more of the at least two applications that have not yet been selected for further communication by the reading device are present by signals being sent that simulate a collision between a plurality of applications.

12. (Previously Presented) The method according to claim 7, wherein the data carrier informs the reading device by means of an allocation of one or more time slots that one or more of the at least two applications that have not yet been selected for further communication by the reading device are present.

13. (Currently Amended) ~~The method according to claim 7, including the further step of~~ A method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier, comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application, and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal

comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application, and

storing information in a nonvolatile memory of the data carrier about which of the at least two applications was last selected for further communication by the reading device.

14. (Previously Presented) The method according to claim 7, including the further step of storing information in a nonvolatile memory of the data carrier about which of the at least two applications has already completed active communication with the reading device.

15. (Previously Presented) The method according to claim 13, wherein upon new communication of the reading device with the data carrier, a communication-readiness signal is emitted first for one of the at least two applications that is different from the application ~~d~~designated by the stored information.

16. (Previously Presented) The method according to claim 13, wherein, upon new communication of the reading device with the data carrier, a communication-readiness signal is emitted first for the application with which active communication was effected last.

17. (Previously Presented) The method according to claim 7, wherein the reading device addresses an application selected for further communication via a dynamically allocated session number.

18. (Currently Amended) The method according to claim 17, wherein upon addressing, the session number is linked on the data carrier with the identification number assigned to the selected application.

19. (Currently Amended) The method according to claim 18, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information ~~in each case~~; and wherein upon addressing, the session number is linked on the data carrier additionally with the additional selection information assigned to the selected application.

20. (Previously Presented) The method according to claim 1, wherein the data carrier recognizes by a response of the reading device to communication-readiness signals emitted by the data carrier whether the reading device is set up to resolve a collision between a plurality of applications.

21. (Previously Presented) The method according to claim 1, wherein the reading device communicates with a plurality of the at least two applications in parallel.

22. (Previously Presented) The method according to claim 1, wherein the reading device interprets the identification numbers as identification numbers of different data carriers.

23. (Currently Amended) The method according to claim 22, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information ~~in each case~~; and wherein the data carrier generates the additional selection information as a virtual sector assignment and the reading device interprets the additional selection information as a sector assignment of a

memory area of one of the different data carriers, whereas the different data carriers may be emulated data carriers.

24. (Currently Amended) A contactlessly communicating portable data carrier, comprising at least ~~two applications~~ a first and second application stored thereon and a communication device for controlling communication between a reading device and the at least ~~two~~ first and second applications, wherein the communication device is ~~set up~~ configured to generate a first communication-readiness ~~signals~~ signal to the reading device which ~~in each case indicate~~ indicates to the reading device a communication readiness for ~~one of the applications~~ the first application and a second communication-readiness signal to the reading device which indicates the reading device a communication readiness for the second application and comprise an identification number assigned to the corresponding communication-readiness application,

wherein the first communication-readiness signal is generated for a first group of applications comprising the first application, and the first identification number is assigned to each of the applications in the first group, and the second communication-readiness signal is generated for a second group of applications comprising the second application, and the second identification number is assigned to each of the applications in the second group, the first communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the first group, and the second communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the second group.

25. (Canceled)

26. (Currently Amended) The data carrier according to claim [[25]] 24, wherein the communication device is set up to assign additional selection information to each of the applications of the group.

27. (Previously Presented) The data carrier according to claim 24, wherein the communication device is set up to generate the communication-readiness signals as response signals to search signals received from a reading device.

28. (Previously Presented) The data carrier according to claim 24, including a toggling device which is set up to toggle between the applications of the data carrier for communication of the applications with a reading device.

29. (Previously Presented) The data carrier according to claim 28, wherein the toggling device is set up to toggle between the applications of the data carrier by means of branching or context switching.

30. (Previously Presented) The data carrier according to claim 24, wherein the communication device is set up to establish the communication between a reading device and an application addressed by the reading device via a session number.

31. (Previously Presented) The data carrier according to claim 30, wherein the communication device is set up to link, upon addressing of the application, the session number with the identification number assigned to the application.

32. (Currently Amended) The data carrier according to claim 31, wherein the communication device is set up to assign additional selection information to each of the applications of the group of applications; and wherein the communication device is set up to link, upon addressing of the application, the session number additionally with the additional selection information assigned to the addressed application.

33. (Previously Presented) The data carrier according to claim 24, wherein the communication device is set up to determine those applications among the at least two applications that are ready for communication with a reading device.

34. (Previously Presented) The data carrier according to claim 33, wherein the communication device is set up to emit communication-readiness signals for one or more of the at least two applications that are ready for communication with a reading device and not yet communicating with a reading device while the communication with one or more others of the at least two applications is not yet completed.

35. (Previously Presented) The data carrier according to claim 33, wherein the communication device is set up to emit communication-readiness signals for one or more of the at least two applications that are ready for communication with a reading device and not yet communicating with a reading device after one or more others of the at least two applications have been suspended after completion of communication with a reading device.

36. (Previously Presented) The data carrier according to claim 24, wherein the communication device is set up to inform the reading device via collision signals simulating a collision between a plurality of applications that one or more of the at least two applications located on the data carrier that have not yet been selected for further communication by the reading device are present.

37. (Currently Amended) ~~The data carrier according to claim 24,~~ A contactlessly communicating portable data carrier, comprising at least two applications stored thereon and a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the communication device is set up to store information in a nonvolatile memory of the data carrier about which of the at least two applications last communicated with a reading device.

38. (Previously Presented) The data carrier according to claim 37, wherein the communication device is set up to emit, upon new contacting of a reading device with the data carrier, a communication-readiness signal first for one of the at least two applications that is different from the application designated by the stored information.

39. (Previously Presented) The data carrier according to claim 24, wherein the communication device is set up to recognize by a response of a reading device to communication-readiness signals emitted by the communication device whether the reading device is set up to resolve collisions between a plurality of applications.

40. (Previously Presented) The data carrier according to claim 24, wherein the data carrier is configured as a contactlessly communicating chip card, contactlessly communicating label, contactlessly communicating identification document or as a (U)SIM mobile communication card.

41. (Previously Presented) The data carrier according to claim 24, wherein the data carrier has a dual interface and can be operated both contactlessly and with contact.

42. (Currently Amended) ~~The data carrier according to claim 24,~~ A contactlessly communicating portable data carrier, comprising at least two applications stored thereon

and a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the data carrier is configured as a security module in a device comprising a communication device ~~means~~ configured for contactless communication, the security module having software ~~means for~~ configured to communicate contactlessly via the communication ~~means~~ device of the device.

43. (Currently Amended) The data carrier according to claim 24, including a memory which is divided into sectors, each of the sectors having no more than one of the at least two applications stored therein ~~in each case~~.

44. (Currently Amended) T~~he data carrier according to claim 43,~~ A contactlessly communicating portable data carrier comprising:

a memory which is divided into sectors,

at least two applications stored on said memory, wherein each of the sectors have no more than one of the at least two applications stored therein, and

a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the communication device is set up to assign additional selection information to each of the applications of [[the]] a group of applications; and

wherein the communication device is set up to assign the at least two applications the additional selection information in the form of a virtual sector assignment and to generate communication-readiness signals for the ~~groups~~ group of applications, the groups in each case comprising applications with pairwise different virtual sector assignments.

45. (Previously Presented) The data carrier according to claim 43, wherein each of the sectors is access-protected separately for access by a reading device to applications stored in said sectors.

46. (Currently Amended) ~~The data carrier according to claim 24,~~ A contactlessly communicating portable data carrier, comprising at least two applications stored thereon and a communication device configured to control communication between a reading device and the at least two applications,

wherein the communication device is set up to generate communication-readiness signals to the reading device which in each case indicate to the reading device a communication readiness for one of the applications and comprise an identification number assigned to the corresponding communication-readiness application, and

wherein the data carrier is configured as an electronic device with a contactless interface for communication with a reading device and with a plurality of memories, each of the memories having no more than one of the at least two applications stored therein in each case.

47. (Previously Presented) The data carrier according to claim 46, wherein the contactless interface is configured as an NFC interface and the data carrier is set up to be operated in the passive mode for communication with a reading device.

48. (Previously Presented) The data carrier according to claim 46, wherein the memories are formed on chip cards, in particular (U)SIM mobile communication cards, secure digital memory cards or EMV payment cards, integrated into the data carrier.

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the specification

The specification and abstract are amended to better conform the specification and abstract to U.S. practice. No new matter is added, since the changes to the specification are minor in nature.

2. In the drawings

A. Amendment to the Drawings

Figures 2 and 3 are presently amended in the REPLACEMENT SHEET of pages 2 and 3 of the drawings. Specifically, text labels are added to identify the various steps in the flow charts. No new subject matter is introduced, since support for the amendments may be found, at least in paragraphs [0035]-[0043] of the description in the specification as originally filed.

B. Objection to the Drawings

Reconsideration of the objection the drawings is requested, in view of the amendments to the figures, on the basis that Figs. 2 and 3 have been amended as suggested by the Examiner.

Specifically, text labels have been added to the flow charts of Figs. 2 and 3.

Accordingly, withdrawal of this objection is requested.

3. Claim Amendments

Claims 1 and 24 are amended to include the subject matter previously presented in claims 2 and 25 respectively.

Claims 3 and 26 are amended to change the dependency from a now canceled claim and clarify the previously presented features. No new matter is added, since the amendments to the claims are minor in nature.

Claims 5, 18, 19 and 32 are amended to clarify the previously presented features and now recite the communication of the selected application. Support for the amendment may be found, for example, at least in paragraph [0017] of the specification as originally filed.

Claims 8, 23, and 43 are amended to clarify the previously presented features as suggested by the Examiner.

Claims 13, 37, 42, 44, and 46 are amended to be rewritten in independent form including all of the limitations of the base claim and intervening claims.

Claims 2 and 25 are canceled without prejudice or disclaimer.

Claims 4, 6-7, 9-12, 14-17, 20-22, 27-31, 33-36, 38-41, 45, and 47-48 are left unchanged.

4. Rejection of claims 3, 5-6, 8, 19, 23, 32, and 44 under 35 U.S.C. § 112, second paragraph

Reconsideration of this rejection is requested, in view of the amendment to the claims, on the basis that the claims more clearly and unambiguously recite the subject matter for which protection is sought.

Specifically, the claims have been amended as suggested by the Examiner.

Accordingly, withdrawal of this rejection is requested.

5. Rejection of claims 1, 4-7, 9-12, 20-22, 24, 27-29, 33-36, and 39-40 under 35 U.S.C. § 102(b) as being anticipated by U.S. publication 2007/0274242 (*Lamacraft et al.*)

Reconsideration of this rejection is respectfully requested, in view of the amendments to claims 1 and 24, on the basis that the cited prior art fails to establish obviousness with respect to amended claims 1 and 24, from which the remaining claims depend.

Specifically, assuming that the Examiner would propose modifying the method for multi-tag emulating of *Lamacraft* in accordance with the teachings of *Rijnswou*, the proposed modification would not have been obvious to the skilled person.

As the Examiner admits, *Lamacraft* fails to disclose the first communication-readiness signal generated for a first group of application and the second communication-readiness signal generated for a second group of applications. At most, *Lamacraft* discloses a method for emulating a plurality of RF data storage devices each having a different identifier and a control means for controlling the transmission simultaneously or sequentially of two or more of the identifiers in response to receipt of a signal from a reader (paragraph [0010]). The method implements multiple co-located RFID tags in a single device by emulating conformance to or compliance with collision detection or collision avoidance methods/protocols in such a way that signals from apparently separate RFID devices actually emanate from or are coupled from the same antenna on the same device (paragraph [0011]). When data collision is detected, the anticollision protocol will then utilize information correctly received, up until the collision occurred, to individually and selectively address particular tag functionalities (paragraph [0095]). In other words, *Lamacraft* discloses that each of the RF data storage devices has a different identifier so that the control means can individually and selectively address particular tag functionalities.

The Examiner in the previous rejection of the prior claims attempts to resolve the missing element in *Lamacraft* by modifying the method for multi-tag emulating of *Lamacraft* in accordance with certain teachings of *Rijnswou* to establish that such modification would have been obvious to result in the claimed invention. *Rijnswou*, however, is only directed to a method for authenticating a plurality of electronic tags with at least one reader station, where each of the electronic tags is associated with a respective unique identity (paragraph [0011]). The authenticating method uses a simple authentication protocol to prevent the smart tag from accidentally releasing the secret data, and only sends the response if the correct challenge has been sent to it by the reader (paragraph [0009]). By ensuring that only a genuine reader can generate the challenge for this ID, a mutual authentication of both the smart tag and the tag reader is achieved (paragraph [0009]). *Rijnswou* also discloses that alternative to manufacturing fully unique IDs, tags may also be produced with group IDs that are unique for a group of tags, e.g., used for one event, and can be made fully unique by adding a further identification, such as a serial number that uniquely identifies the tags within the set (paragraph [0011]).

From these disclosures, and taking into account the absence of evidence of general knowledge and common sense, Applicants do not observe any suggestion, motivation, or other rationale that would have led one having ordinary skill in the art to modify the method for multi-tag emulating of *Lamacraft* in accordance with the teachings of *Rijnswou*. Specifically, Applicants do not observe any evidence why the skilled person would have been motivated to modify a method that selects a different identifier for each RF data storage device with the teaching of a producing a group of IDs for a particular event for a group of tags as taught in *Rijnswou*.

Although the Examiner suggests that the skilled person would have been motivated to modify the multiple emulated tags of *Lamacraft* to include group IDs to identify each tag of the same type to assist the reader in only reading the specific type of tag desired and reading all of the same specific types of tag, Applicants do not observe any evidence to support the Examiner's conclusion. Instead, as discussed above,

Lamacraft is directed to providing each of the RF data storage devices a different identifier so that collision of the reader-functionality for two or more tag functionalities can be avoided and/or detected. For example, the NFC device is used to emulate a data collision event to communicate the presence of multiple tags to the interrogating reader based on their different identifiers (paragraph [0137]). The reader will then use its internal protocol to select the tag it is interested in and continue communication with that tag (paragraph [0137]). *Rijnswou*, however, fails to cure the deficiencies of *Lamacraft*, since *Rijnswou* does not relate to establishing a connection to several ones of the RF data storage devices at the same time, but only discloses sending a challenge signal to authenticate the electronic tags for a group of tags tied to a particular event or individual tags.

In other words, Applicants submit that the Examiner has not provided the necessary objective evidence with rational underpinning to establish that the skilled person would have been motivated to modify the method for multi-tag emulating of *Lamacraft* to instead include an additional identification for a group of tags to tie the multi-tag emulating device to a particular event.

In fact, assuming that the Examiner would propose modifying the method for the multi-tag emulating of *Lamacraft* in accordance with the group of IDs of *Rijnswou*, Applicants submit that such a modification would be improper since the assumed modification would change the principle of operation of *Lamacraft* (MPEP 2143.01 (VI)). Specifically, since *Lamacraft* is directed to detecting data collisions or using anticollision protocols by identifying the different identifiers for each data storage device, Applicants submit that by adding an additional group ID the operation of the data collision and anticollision protocols as disclosed in *Lamacraft* would have changed which changes the basic operation of *Lamacraft* (*see* Figs. 14-21b).

Applicants submit that only through the present application is the skilled person taught of a method for contactless communication of a plurality of mutually

uncoordinated applications of a portable data carrier with a reading device (paragraph [0010]). In this method, the identification numbers perform the role played in the prior art by the identification number (UID, PUPI and the like) assigned to the data carrier, so that the reading device can thus address one application of a plurality of applications located on the data carrier selectively and independently of the data carrier via the identification number (paragraph [0013]). By assigning the same identification number to groups of applications on the same data carrier, groups of these applications can be designed such that they do not interfere with one another even though they use the same identification number, which is not the case for the different RFID tags of *Lamacraft*.

Since the Examiner has not provided objective reasoning with rationale underpinning to show that the skilled person would have been motivated to modify the method for multi-tag emulating of *Lamacraft* in accordance with the teachings of *Rijnswou*, the assumed proposed modification is improper, and obviousness with respect to amended claim 1 cannot be established.

Claim 24 is allowable over the cited prior art references for reciting an apparatus having similar features as recited in the method of claim 1.

The remaining claims are allowable over the cited prior art at least for their dependency on claims 1 and 24, as well as their individually recited features.

Accordingly, withdrawal of this rejection is requested.

6. Rejection of claims 2-3, 8, and 25-26 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the cited prior art fails to establish obviousness with respect to amended claims 1 and 24, as discussed above, from which claims 2-3, 8, and 25-26 depend.

Accordingly, withdrawal of this rejection is requested.

7. Rejection of claim 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2006/0065731 (*Powell et al.*)

Reconsideration of this rejection is requested on the basis that the rejection fails to establish obviousness with respect to amended claim 1, from which claim 14 depends.

Specifically, the teachings of *Powell* fail to cure the deficiencies of the assumed modification of the method of *Lamacraft* using the disclosure of *Rijnswou*. At most, *Powell* discloses a method for the negotiation of a population of RFID tags with improved security by singulating without using information that directly identifies the tags in the tag population (abstract). *Powell*, however, also fails to provide any evidence that one having ordinary skill in the art at the time of the present invention would have been motivated to modify the method of multi-tag emulating of *Lamacraft* to include groups of applications to result in the claimed features. Therefore, the proposed modification of the method of *Lamacraft* in accordance with the teachings of *Rijnswou* and *Powell* is improper and fails to result in the features recited in amended claim 1, from which claim 14 depends, and obviousness cannot be established.

Accordingly, withdrawal of this rejection is requested.

8. Rejection of claims 17-18 and 30-31 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. patent 6,421,196 (*Takayama et al.*)

Reconsideration of this rejection is requested on the basis that the rejection fails to establish obviousness with respect to amended claims 1 and 24, from which claims 17-18 and 30-31 depend.

Specifically, the teachings of *Takayama* fail to cure the deficiencies of the assumed modification of the method of *Lamacraft* using the disclosure of *Rijnswou*. At most, *Takayama* discloses a method for controlling a recording medium by reading identification information from a non-contact-type memory of the recording medium with

a remote memory interface (abstract). *Takayama*, however, also fails to provide any evidence that one having ordinary skill in the art at the time of the present invention would have been motivated to modify the method of multi-tag emulating of *Lamacraft* to include groups of applications to result in the claimed features. Therefore, the proposed modification of the method of *Lamacraft* in accordance with the teachings of *Rijnswou* and *Takayama* is improper and would have failed to result in each and every feature recited in amended claims 1 and 24, from which claims 17-18 and 30-31 depend, and obviousness cannot be established.

Accordingly, withdrawal of this rejection is requested.

9. Rejection of claims 19 and 32 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. patent 6,421,196 (*Takayama et al.*) and further in view of U.S. publication 2008/0109899 (*Rijnswou Van et al.*)

Reconsideration of this rejection is requested on the basis that the rejection fails to establish obviousness with respect to amended claims 1 and 24, from which claims 19 and 32 depend.

Specifically, as discussed above, the teachings of *Takayama* and *Rijnswou* fail to provide evidence that would have led the skilled person to have modified the method of *Lamacraft*. Therefore, the proposed modification of the method of *Lamacraft* in accordance with the teachings of *Rijnswou* and *Takayama* is improper and would have failed to result in each and every feature recited in amended claims 1 and 24, from which claims 19 and 32 depend, and obviousness cannot be established.

Accordingly, withdrawal of this rejection is requested.

10. Rejection of claim 41 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2006/0206343 (*Nakanishi et al.*)

Reconsideration of this rejection is requested on the basis that the rejection fails to establish obviousness with respect to amended claim 24, from which claim 41 depends.

Specifically, the teachings of *Nakanishi* fail to cure the deficiencies of the assumed modification of the method of *Lamacraft* using the disclosure of *Rijnswou*. At most, *Nakanishi* discloses making an information storage device with a plurality of communication functions which perform a process by one of the communication functions in cooperation with another process performed by the other communication function (abstract). *Nakanishi*, however, also fails to provide any evidence that one having ordinary skill in the art at the time of the present invention would have been motivated to modify the method of multi-tag emulating of *Lamacraft* to include groups of applications to result in the claimed features. Therefore, the proposed modification of the method of *Lamacraft* in accordance with the teachings of *Rijnswou* and *Nakanishi* would have been improper and fails to result in each and every feature recited in amended claim 24, from which claim 41 depends, and obviousness cannot be established.

Accordingly, withdrawal of this rejection is requested.

11. Rejection of claim 43 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*)

Reconsideration of this rejection is requested on the basis that the rejection fails to establish obviousness with respect to amended claim 24, from which claim 43 depends.

Specifically, as discussed above, *Lamacraft* fails to disclose each and every feature recited in amended claim 24, from which claim 43 depends.

Accordingly, withdrawal of this rejection is requested.

12. Rejection of claim 45 under 35 U.S.C. § 103(a) as being unpatentable over U.S. publication 2007/0274242 (*Lamacraft et al.*) in view of U.S. publication 2005/0007236 (*Lane et al.*)

Reconsideration of this rejection is requested on the basis that the rejection fails to establish obviousness with respect to amended claim 24, from which claim 45 depends.

Specifically, the teachings of *Lane* fail to cure the deficiencies of the assumed modification of the method of *Lamacraft* using the disclosure of *Rijnswou*. At most, *Lane* discloses a method for authenticating currency and other important documents using an embedded RFID transponder (abstract). *Lane*, however, also fails to provide any evidence that one having ordinary skill in the art at the time of the present invention would have been motivated to modify the method of multi-tag emulating of *Lamacraft* to include groups of applications to result in the claimed features. Therefore, the proposed modification of the method of *Lamacraft* in accordance with the teachings of *Rijnswou* and *Lane* is improper and fails to result in each and every feature recited in amended claim 24, from which claim 45 depends, and obviousness cannot be established.

Accordingly, withdrawal of this rejection is requested.

13. Allowable Subject Matter

Applicants are gratefully appreciative of the Examiner's indication that claims 13, 15-16, 23, 37-38, 42, 44, and 46-48 recite allowable subject matter and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In view of the indication of allowable subject matter, claims 13, 37, 42, 44, and 46 have been rewritten in independent form including the subject matter of the base claim and any intervening claims. Additionally, claims 1 and 24 have been amended and are allowable over the cited prior art as discussed above.

14. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is requested that the currently presented claims be approved and the application passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicants' attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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Date: November 30, 2012

Respectfully submitted,

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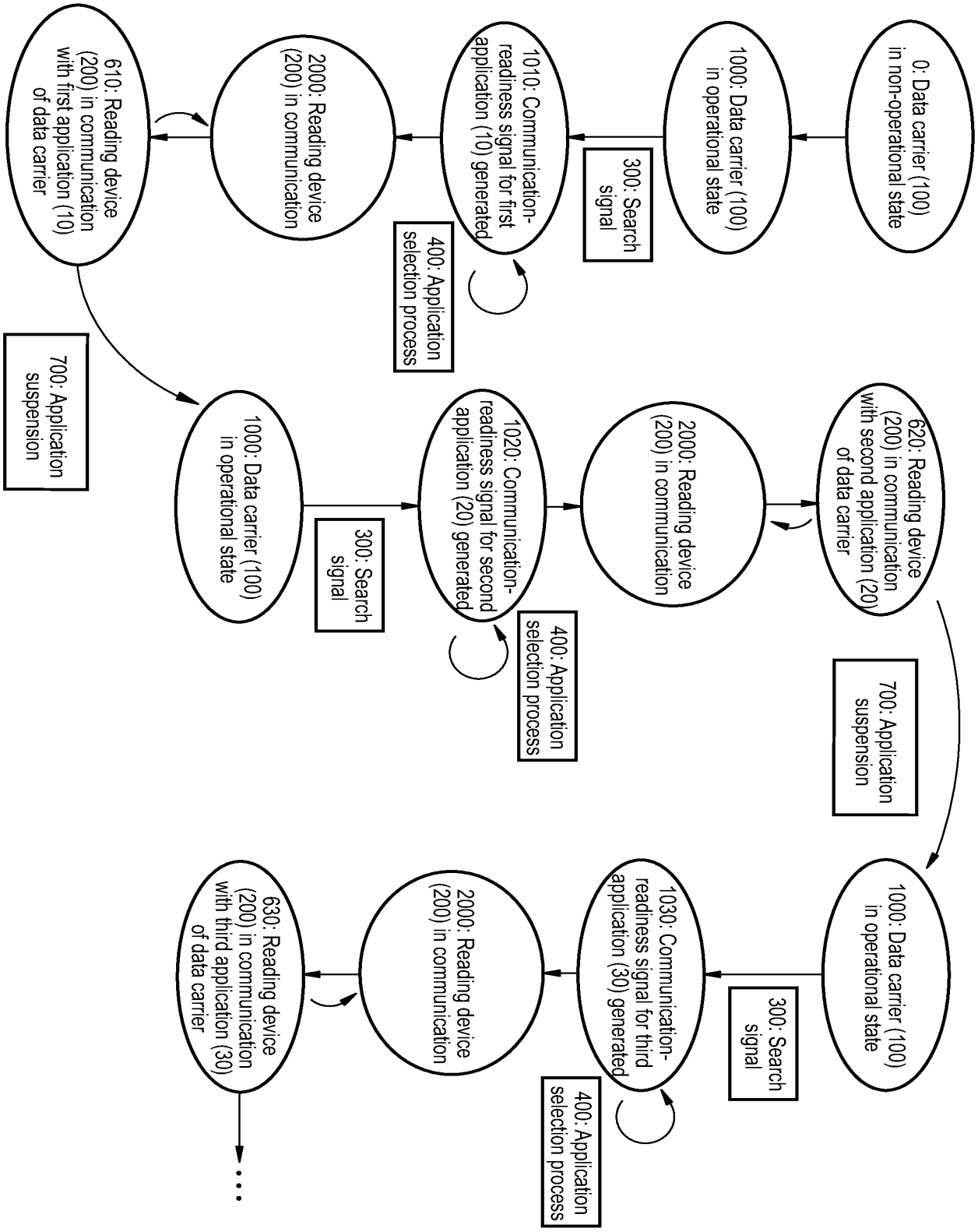
Registration No. 19,179

FIG 2

0: Data carrier (100) in non-operational state
1000: Data carrier (100) in operational state
300: Search signal
1010: Communication-readiness signal for first application (10) generated
400: Application selection process
2010: Reading device (200) in communication with first application (10) of data carrier
510: First application (10) adressed
300: Search signal
1020: communication-readiness signal for second application (20) generated
400: Application selection process
2010, 2020: Reading device (200) in communication with first (10) and second application (20) of data carrier
510: First application (10) adressed
520:Second application (20) adressed
300: Search signal
1030: communication-readiness signal for third application (30) generated
400: Application selection process
2010, 2020, 2030: Reading device (200) in communication with first (10), second (20) and third application (30) of data carrier
510: First application (10) adressed
520:Second application (20) adressed
530: Third application (30) adressed
...

FIG 3


0: Data carrier (100) in non-operational state
1000: Data carrier (100) in operational state
300: Search signal
1010: Communication-readiness signal for first application (10) generated
400: Application selection process
2000: Reading device (200) in communication
610: Reading device (200) in communication with first application (10) of data carrier
700: Application suspension
1000: Data carrier (100) in operational state
300: Search signal
1020: Communication-readiness signal for second application (20) generated
400: Application selection process
2000: Reading device (200) in communication
620: Reading device (200) in communication with second application (20) of data carrier
700: Application suspension
1000: Data carrier (100) in operational state
300: Search signal
1030: Communication-readiness signal for third application (30) generated
400: Application selection process
2000: Reading device (200) in communication
630: Reading device (200) in communication with third application (30) of data carrier
...

Electronic Patent Application Fee Transmittal

Application Number:	12304653
Filing Date:	04-Mar-2009
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Filer:	J. Ernest Kenney
Attorney Docket Number:	FINK3009/JEK/TL

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Independent claims in excess of 3	1614	4	250	1000
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**1000**

Electronic Acknowledgement Receipt

EFS ID:	14348268
Application Number:	12304653
International Application Number:	
Confirmation Number:	7360
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Customer Number:	23364
Filer:	J. Ernest Kenney/Jennifer McCarthy
Filer Authorized By:	J. Ernest Kenney
Attorney Docket Number:	FINK3009/JEK/TL
Receipt Date:	30-NOV-2012
Filing Date:	04-MAR-2009
Time Stamp:	12:26:30
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1000
RAM confirmation Number	11031
Deposit Account	020200
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)					
File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1		amend_nfoa_19NOV12.pdf	191671 780c639b63d230b02f880bcb0ec4a469f1a14e2c	yes	29

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	2
Specification	3	3
Abstract	4	5
Drawings-only black and white line drawings	6	6
Claims	7	18
Applicant Arguments/Remarks Made in an Amendment	19	29

Warnings:					
Information:					
2	Drawings-only black and white line drawings	Replacement_Sheets.pdf	531440 d503304ae6c5f55aaa2532ad4413943e24f18ff1	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30448 a8fcd9a583fbe97b67f962912c53382c897e20d3	no	2
Warnings:					
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/304,653	03/04/2009	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY ☐ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/30/2012	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 46	Minus	** 48	= 0	X $ =		OR	X $62=	0
	Independent (37 CFR 1.16(h))	* 7	Minus	***3	= 4	X $ =		OR	X $250=	1000
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	1000

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/KIMBERLY WHITE/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/JEK	7360

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EXAMINER	
BEE, ANDREW W.	
ART UNIT	PAPER NUMBER
2612	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/304,653	FINKENZELLER ET AL.	
	Examiner	Art Unit	
	ANDREW BEE	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-48* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-12,14,17-36,39-41 and 43-45* is/are rejected.

8)☒ Claim(s) *13,15,16,37,38,42 and 46-48* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *12 December 2008* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to communications filed 12/12/2008. Claims 1-48 are currently pending in the application.

Drawings

2. The drawings are objected to because figures 2 and 3 lack any text labels to identify the various steps in the flow charts, thus it is unclear what each flow chart represents. Text labels for each of the steps in the flow charts will provide for clear and useful figures. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3, 5-6, 8, 19, 23, 32, and 44 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3, 8, 19, and 23 each describe assigning "additional selection information in each case" which is indefinite because it is unclear what is meant by "in each case". For example, does "in each case" refer to assigning additional selection information permanently to the applications, each time a communication-readiness signal is sent, or something else? For clarity, it is suggested that this limitation in claims 3, 8, 19, and 23 be amended to recite "...is assigned additional selection information ~~in each case~~…"

Claims 5, 18-19, and 32 recite "the application". Multiple applications have been identified, thus it is unclear which application is being referred to by "the application".

Claim 6 is rejected because of its dependency on previously rejected claim 5.

Claims 8, 19, and 23 lack antecedent basis for "the first group" and "the second group".

Claims 32 and 44 lack antecedent basis for "the group".

Claim 44 lacks antecedent basis for "the groups".

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 4-7, 9-12, 20-22, 24, 27-29, 33-36, and 39-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Lamacraft et al. (US 2007/0274242).

As per claim 1, Lamacraft teaches a method for contactless communication of a reading device with at least two communication-ready applications located on a portable data carrier (para. 0010-0011 and 0016: Communication between RFID devices and readers is contactless; the multiple emulated RFID tags in the single RFID device are the communication-ready applications) comprising the steps:

generating a first communication-readiness signal to the reading device for a first of the at least two applications, the communication-readiness signal comprising a first identification number which is assigned to the first of the at least two applications and indicates to the reading device the communication readiness of said first application (para. 0019 and 0136: Identifiers for each of the emulated tags are sent to the reader; thus an identifier, which is an identification number, for a first emulated tag is sent to the reader; the sending of identifiers indicates communication readiness of each of the emulated tags because the ability to receive a reader signal and respond to the reader signals is an indication of communication readiness), and

generating a second communication-readiness signal to the reading device for a second of the at least two applications, the second communication-readiness signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device the communication readiness of said second application (para. 0019 and 0136: Identifiers for each of the emulated tags are sent to the reader; thus an identifier, which is an identification number, for a second emulated tag is sent to

the reader; the sending of identifiers indicates communication readiness of each of the emulated tags because the ability to receive a reader signal and respond to the reader signals is an indication of communication readiness; the identifiers are different for each emulated tag).

As per claim 4 (dependent on claim 1), Lamacraft further teaches:

wherein the reading device emits search signals, the signals generated for the applications comprising response signals to the search signals (fig. 25a and para. 0125-0128: The reader emits RF and modulated RF signals without knowing what tags are present; the tags that happen to be present respond to the reader's signals; thus the initial RF and modulated RF signals are considered search signals).

As per claim 5 (dependent on claim 1), Lamacraft further teaches:

including the further step of toggling between the applications for communication of the application with a reading device (para. 0116 and 0128: The communicating for different emulated tags in different time slots is toggling between the emulated tags, or different applications).

As per claim 6 (dependent on claim 5), Lamacraft further teaches:

wherein toggling is effected by branching or by context switching (para. 0116 and 0128: The switching between emulated tags can be considered branching or context switching).

As per claim 7 (dependent on claim 1), Lamacraft further teaches:

wherein the reading device selects for further communication one or more of the at least two applications via the identification numbers assigned to the applications (para. 0136-0138: The reader identifies each emulated tag and selects an emulated tag for further communication;

the selection is based on what type of tag the emulated tag represents, thus is based on the tag identifier).

As per claim 9 (dependent on claim 7), Lamacraft further teaches:

wherein for one or more of the at least two applications that have not yet been selected for further communication by the reading device, the communication-readiness signal is generated while the communication with one or more others of the at least two applications that have been selected for further communication by the reading device is not yet completed (para. 0136-0138: When a reader is for reading a certain type of tag, such as a train ticket, as the reader identifies tags as train tickets, the tags are selected for further communication; identification from other tags may still be incoming to the reader, thus at least one tag that has not yet been sleecte3d for further communication may be sending identifier data while the reader is not yet done communicating with an already selected tag).

As per claim 10 (dependent on claim 7), Lamacraft further teaches:

wherein for one or more of the at least two applications that have not yet been selected for further communication by the reading device, the communication-readiness signal is generated after one or more others of the at least two applications have been suspended after completion of communication with the reading device (para. 0136-0138: When the reader is for reading a specific type of tag, it will identify and read that type of tag and then end communication, the reader may then be interested in a different type of tag and thus initiate communication with the emulated tag again; in this case the tags, including those not previously selected for further communication, will have their identifiers sent to the reader).

As per claim 11 (dependent on claim 7), Lamacraft further teaches:

wherein the data carrier informs the reading device by means of collision signals that one or more of the at least two applications that have not yet been selected for further communication by the reading device are present by signals being sent that simulate a collision between a plurality of applications (para. 0130 and 1036-0138: The RFID device may emulate a collision between tags so that the reader recognizes that a plurality of tags need to communicate and initiates collision protocols).

As per claim 12 (dependent on claim 7), Lamacraft further teaches:

wherein the data carrier informs the reading device by means of an allocation of one or more time slots that one or more of the at least two applications that have not yet been selected for further communication by the reading device are present (fig. 23 and para. 0116: The RFID device may cause emulated tag identifiers to be communicated in time slots so the reader can receive the data for each emulated tag).

As per claim 20 (dependent on claim 1), Lamacraft further teaches:

wherein the data carrier recognizes by a response of the reading device to communication-readiness signals emitted by the data carrier whether the reading device is set up to resolve a collision between a plurality of applications (fig. 25 and para. 0129-0130: Based on the response of the reader to emulated collisions, the RFID device will recognize that the reader can handle data collisions).

As per claim 21 (dependent on claim 1), Lamacraft further teaches:

wherein the reading device communicates with a plurality of the at least two applications in parallel (para. 0136-0138: The reader can communicate with multiple emulated tags in parallel through data collision protocols and time slotting).

As per claim 22 (dependent on claim 1), Lamacraft further teaches:

wherein the reading device interprets the identification as identification numbers of different data carriers (para. 0011: To the reader the emulated tags appear as actual separate tags).

As per claim 24, Lamacraft teaches all the claim limitations as in the consideration of claim 1 above since the components of claim 24 are the apparatus for performing the method considered in claim 1.

As per claim 27, Lamacraft teaches the claim limitations of claim 24, plus the consideration of claim 4 above.

As per claim 28, Lamacraft teaches the claim limitations of claim 24, plus the consideration of claim 5 above.

As per claim 29, Lamacraft teaches the claim limitations of claim 24, plus the consideration of claim 6 above.

As per claim 33 (dependent on claim 24), Lamacraft further teaches:

wherein the communication device is set up to determine those applications among the at least two applications that are ready for communication with a reading device (fig. 25 and para. 0128: The RFID device determines which emulated tags can respond to the reader protocol; the tags that can respond to the reader protocol are those ready for communication).

As per claim 34, Lamacraft teaches the claim limitations of claim 33, plus the consideration of claim 9 above.

As per claim 35, Lamacraft teaches the claim limitations of claim 33, plus the consideration of claim 10 above.

As per claim 36, Lamacraft teaches the claim limitations of claim 24, plus the consideration of claim 11 above.

As per claim 39, Lamacraft teaches the claim limitations of claim 24, plus the consideration of claim 20 above.

As per claim 40 (dependent on claim 24), Lamacraft further teaches:

wherein the data carrier is configured as a contactlessly communicating chip card, contactlessly communicating label, contactlessly communicating identification document or as a (U)SIM mobile communication card (para. 0027: The RFID device could be a transport ticket, thus being a contactlessly communicating chip card or label).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2-3, 8, and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Rijnswou Van et al. (US 2008/0109899).

As per claim 2 (dependent on claim 1), Lamacraft does not disclose:

wherein the first communication-readiness signal is generated for a first group of applications comprising the first application, and the first identification number is assigned to each of the applications in the first group, and the second communication-readiness signal is generated for a second group of applications comprising the second application, and the second identification number is assigned to each of the applications in the second group, the first

communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the first group, and the second communication-readiness signal indicating to the reading device the communication readiness of each of the applications of the second group.

However, in the same art of potable data carriers, Rijnswou Van teaches that ID tags may have group IDs to identify the tags as part of a group (Rijnswou Van, para. 0011).

Furthermore, Lamacraft's teaching of multiple emulated tags of varying types suggests that there are reasonably multiple emulated tags of each type (Lamacraft).

Thus, in this combination, for Lamacraft's reader to read only a specific type of tag, the emulated tags would need some sort of group ID identifying which type of tag they are. Thus, Lamacraft's tags would include group IDs to identify each tag of the same type. Therefore, the group IDs for each type are the identification number for each group and part of the communication-readiness signals for each group.

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft's emulated tags of different types to include group IDs to identify which type of tag they are, as taught by Rijnswou Van. The motivation is because the type of tag identification will assist the reader in only reading the specific type of tag desired, and reading all of the same specific type of tag. Group IDs as part of tag identification is well known and commonly used in the data carrier art.

As per claim 3 (dependent on claim 2), Lamacraft in view of Rijnswou Van further teaches:

wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information in each case (Rijnswou Van, para. 0011: Each tag has additional data to be uniquely identified even from the group; thus in this combination Lamacraft's reader can uniquely identify single emulated tags from tag groups in order to communicate with single emulated tags).

As per claim 8, Lamacraft teaches the claim limitations of claim 7. Further limitations are met by Lamacraft in view of Rijnswou Van as in the consideration of claim 2 above. The selection of a single tag to communicate with in this combination is based on the group ID and the additional identification for uniquely identifying each tag.

As per claim 25, Lamacraft teaches the limitations of claim 24 and further limitations are met by Lamacraft in view of Rijnswou Van as in the consideration of claim 3 above. Lamacraft's identifiers for the emulated tags can include group IDs as taught by Rijnswou Van thus indicating the communication readiness of groups of emulated tags.

As per claim 26, Lamacraft in view of Rijnswou renders obvious the limitations of claim 25, plus the consideration of claim 3 above. The control, or communication device, for the tag emulation stores the tag data, and thus adds the further identification for each tag to uniquely identify each tag in a group.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Powell et al. (US 2006/0065731).

As per claim 14 (dependent on claim 7), Lamacraft does not disclose:

the further step of storing information in a nonvolatile memory of the data carrier about which of the at least two applications has already completed active communication with the reading device.

However, in the same art of reading data carriers, Powell teaches that RFID tags may include a flag that is set to indicate whether the tag has already been read, or completed active communication with the reader (Powell, para. 0061 and 0069);

Thus, in this combination, each of Lamacraft's emulated tags would include a flag to be set indicating if the emulated tag has already been read. The read flags would reasonably be stored in the RFID devices nonvolatile memory.

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft's RFID to include information about which emulated tags have already been read, as taught by Powell. The motivation is to provide the reader a way to only read tags that have not already been read (Powell, para. 0061), thus eliminating redundant reads and assisting to provide a more efficient system.

10. Claims 17-18 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Takayama et al. (US 6,421,196).

As per claim 17 (dependent on claim 7), Lamacraft does not disclose:

wherein the reading device addresses an application selected for further communication via a dynamically allocated session number.

However, in the same art of reading data carriers, Takayama teaches:

wherein the reading device addresses an application selected for further communication via a dynamically allocated session number (Takayama, col. 15 line 60-col. 16 line 13: The

library controller, which is the reader, gives a session identifier, or number, to the remote memory chip, or application; for further communication, the library controller addresses the remote memory chip using the session identifier; the session identifier is dynamically allocated because the library controller gives session identifiers as each remote memory chip is identified).

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft's reader to assign session identifiers to the emulated tags, as taught by Takayama. The motivation is that a session identifier can be used to identify a tag in place of the tags normal identification. The session identifier is much shorter in length and thus more efficient and effective for communication and identification (Takayama, col. 16 lines 6-13). It is reasonable for Lamacraft's emulated tags to be treated as actual tags, including receiving session numbers, because Lamacraft's emulated tags represent actual tags.

As per claim 18 (dependent on claim 17), Lamacraft in view of Takayama further teaches:

wherein upon addressing, the session number is linked on the data carrier with the identification number assigned to the application (Takayama, col. 15 line 60-col. 16 line 13 and Lamacraft, para. 0010-0011: Since Lamacraft's emulated tag information is on the single RIFD device, the session numbers of Takayama from the reader would have to be linked to the correct identification for each emulated tag of Lamacraft's).

As per claim 30, Lamacraft teaches the limitations of claim 24 and further limitations are met by Lamacraft in view of Takayama as in the consideration of claim 17 above since Lamacraft's RFID device would use the session number to identify the emulated tag to communicate with the reader.

As per claim 31, Lamacraft in view of Takayama renders obvious the limitations of claim 30, plus the consideration of claim 18 above.

11. Claims 19 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Takayama and further in view of Rijnswou Van.

As per claim 19, Lamacraft in view of Takayama renders obvious the limitations of claim 18. Further limitations are met by Lamacraft in view of Takayama and Rijnswou Van. Rijnswou Van can be combined with Lamacraft in view of Takayama for the same reasoning as the combination of Lamacraft and Rijnswou Van as in the consideration of claim 2 above. The tags can be groups of tags with group IDs, and additional information to uniquely identify individual tags can be included, thus the session numbers assigned to each tag will be linked to the group ID and further information for each emulated tag.

As per claim 32, Lamacraft in view of Takayama renders obvious the limitations of claim 31. Further limitations are met by Lamacraft in view of Takayama and Rijnswou Van as in the consideration of claim 19 above.

12. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Nakanishi et al. (US 2006/0206343).

As per claim 41 (dependent on claim 24), Lamacraft does not disclose:

wherein the data carrier has a dual interface and can be operated both contactlessly and with contact.

However, in the same art of data carriers, Nakanishi teaches:

wherein the data carrier has a dual interface and can be operated both contactlessly and with contact (Nakanishi, para. 0038-0040: The card, which is the data carrier, is used for ticketing, and has both contact and contactless interface for operation).

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft's RFID device to have both contact and contactless interface for operation, as taught by Nakanishi. The motivation is to provide more communication options and provide for more efficient communication because both the contact and contactless communication can be performed (Nakanishi, para. 0038-0040).

13. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft.

As per claim 43 (dependent on claim 24), Lamacraft does not necessarily disclose:

including a memory which is divided into sectors each of the sectors having no more than one of the at least two applications stored therein in each case.

However, Lamacraft's emulated tag information must be stored somewhere in memory, and it is reasonable that each emulated tag would be stored in a separate memory location as this would be one of the available and known options for storing the emulated tag information. The separate locations for each emulated tag can be considered memory sectors, thus each emulated tag would be stored in a separate sector.

14. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamacraft in view of Lane et al. (US 2005/0007236).

As per claim 45 (dependent on claim 43), Lamacraft does not necessarily disclose:

wherein each of the sectors is access-protected separately for access by a reading device to applications stored in said sectors.

However, in the same art of data carriers, Lane teaches:

access protecting data on RFID tags (Lane, para. 0025);

At the time of the claimed invention it would have been obvious to one of ordinary skill in the art for Lamacraft's emulated tags to have access protection, as taught by Lane. The motivation is because access protecting tags is well known in the art of data carriers. It is very common for tags to have access protection that requires a password, encryption, or some other key from the reader. Access protection is known for preventing fraudulent reading or modifying of tag data. Thus, in the case of Lamacraft's emulated tags, it is reasonable that there would access protection for each emulated tag, as the information each emulated tag represents can be sensitive and a user may desire limited access for reading and modifying the stored data.

Allowable Subject Matter

15. Claims 13, 15-16, 23, 37-38, 42, 44, and 46-48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if any 35 U.S.C. 112, second paragraph, issues are resolved.

16. The following is a statement of reasons for the indication of allowable subject matter: There is no reasonable combination of references to teach the limitations of each of the indicated allowable claims. Although many of the limitations in the claims can be found throughout the prior art, there is insufficient motivation to combine the needed references to reject each claim as a whole.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1) Irisawa et al. (US 2004/0199784) teaches a plurality of addressable applications on a single device.

2) Pendlebury et al. (US 2009/0243810) teaches a device that can emulate multiple RFID tags.

3) Ayatsuka et al. (US 2005/0066039) teaches including a group ID an RF tags.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW BEE whose telephone number is (571)270-5183. The examiner can normally be reached on Monday-Thursday 8am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Mehmood can be reached on (571)272-2976. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANDREW BEE/
Examiner, Art Unit 2612

Notice of References Cited	Application/Control No. 12/304,653	Applicant(s)/Patent Under Reexamination FINKENZELLER ET AL.	
	Examiner ANDREW BEE	Art Unit 2612	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,421,196 B1	07-2002	Takayama et al.	360/71
*	B	US-2004/0199784 A1	10-2004	Irisawa et al.	713/200
*	C	US-2005/0007236 A1	01-2005	Lane et al.	340/005.86
*	D	US-2005/0066039 A1	03-2005	Ayatsuka et al.	709/228
*	E	US-2006/0065731 A1	03-2006	Powell et al.	235/451
*	F	US-2006/0206343 A1	09-2006	Nakanishi et al.	705/001
*	G	US-2007/0274242 A1	11-2007	Lamacraft et al.	370/310
*	H	US-2008/0109899 A1	05-2008	Rijnswou Van et al.	726/21
*	I	US-2009/0243810 A1	10-2009	Pendlebury et al.	340/10.4
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PTO/SB/08A (09-06)

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	12/304,653
Filing Date	December 12, 2008
First Named Inventor	Klaus FINKENZELLER
Art Unit	2194
Examiner Name	Unassigned
Attorney Docket Number	FINK3009/JEK

Sheet 1 of 1

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. 1	Document Number Number-Kind Code2	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. 1	Foreign Patent Document Country Code3-Number 4-Kind Code5 (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6
		EP 1 450 299 A1	08-25-2004	DAI NIPPON PRINTING CO., LTD.		
		WO 2006/010943 A1	02-02-2006	INNOVISION RESEARCH & TECHNOLOGY PLC		

Examiner Signature	/Andrew Bee/	Date Considered	08/24/2012

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1Applicant's unique citation designation number (optional). 2See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.B./

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	Art Unit
	ANDREW BEE	2612

SEARCHED			
Class	Subclass	Date	Examiner
340	10.1,10.2,10.4,10.41,10.42	8/30/2012	/A.B./

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor name search	8/30/2012	/A.B./
EAST search	8/30/2012	/A.B./

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12304653	FINKENZELLER ET AL.
	Examiner	Art Unit
	ANDREW BEE	2612

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/30/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	O								
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	33	✓								
	34	✓								
	35	✓								
	36	✓								

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CLAIM		DATE								
Final	Original	08/30/2012								
	37	O								
	38	O								
	39	✓								
	40	✓								
	41	✓								
	42	O								
	43	✓								
	44	✓								
	45	✓								
	46	O								
	47	O								
	48	O								

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L11	2451	contact near10 contactless$3 near10 (ticket card smart$2card tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
L12	1983	contact near5 contactless$3 near5 (ticket card smart$2card tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
L13	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
L15	72	L13 and 12	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
L16	6764	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
L17	53	L16 and 12	US-PGPUB; USPAT	OR	ON	2012/08/30 14:26
L19	17	contact near5 contactless$3 near5 (ticket)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:27
L20	663	(emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/30 14:59
L21	5	L20 and (memory near20 (sector))	US-PGPUB; USPAT	OR	ON	2012/08/30 14:59
L22	35	rfid adj tag near10 access near2 protect$4	US-PGPUB; USPAT	OR	ON	2012/08/30 15:13
L23	127	20 and (plural$5 multipl$6 many) near5 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:19
L24	24	20 same (plural$5 multipl$6 many) near5 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:19
L25	12	20 same (plural$5 multipl$6 many) near2 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:20
L26	63	20 and (plural$5 multipl$6 many) near2 memories	US-PGPUB; USPAT	OR	ON	2012/08/30 15:21
L27	3	13 and 26	US-PGPUB; USPAT	OR	ON	2012/08/30 15:21
S1	45	(FINKENZELLER-KLAUS FINKENZELLER-K$3 (FINKENZELLER near3 KLAUS) HARTEL-KARL	US-PGPUB;	OR	ON	2012/08/24 10:22

		HARTEL-K$3 (HARTEL near3 KARL) BRANDL-DENNY BRANDL-D$3 (BRANDL near3 DENNY)).in.	USPAT			
S2	4	S1 and ((interrogat$4 scan$4 read reader reading) and application).clm.	US-PGPUB; USPAT	OR	ON	2012/08/24 10:22
S3	2	("20070274242" "20040199784").pn.	US-PGPUB; USPAT	OR	ON	2012/08/24 11:02
S4	3	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$).did.	US-PGPUB	OR	ON	2012/08/27 10:19
S6	2	S4 and emulat$4	US-PGPUB; USPAT	OR	ON	2012/08/27 10:20
S7	663	(emulat$4 simulat$4) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 15:42
S8	8552	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/27 15:43
S9	31	S8 and S7	US-PGPUB; USPAT	OR	ON	2012/08/27 15:43
S10	53	(emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:00
S11	149	(emulat$4 simulat$4) near5 (group) near5 (tag transponder application card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:03
S12	1	S8 and S11	US-PGPUB; USPAT	OR	ON	2012/08/27 16:03
S13	15	(single one individual) near10 (emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:33
S14	15	(single one individual data adj carrier) near10 (emulat$4 simulat$4) near5 (group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:33
S15	0	(single one individual parent) near2 ticket near10 (emulat$4 simulat$4) near5 (group family child$3) near5 (ticket)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:36
S16	6679	(emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:37
S17	226	S8 and S16	US-PGPUB; USPAT	OR	ON	2012/08/27 16:38
S18	2441	(single one individual parent) near10 (emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near5 (rf$2id tag transponder carrier card smart$2card)	US-PGPUB; USPAT	OR	ON	2012/08/27 16:38
S19	1874	(single one individual parent) near10 (emulat$4 simulat$4 represent$6) near5 (multipl$5 plural$4 many group) near2 (rf$2id tag transponder carrier card	US-PGPUB; USPAT	OR	ON	2012/08/27 16:39

		smart$2card)				
S20	71	S8 and S19	US-PGPUB; USPAT	OR	ON	2012/08/27 16:39
S21	6742	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S22	63	S21 and S19	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S23	53	S22 not S9	US-PGPUB; USPAT	OR	ON	2012/08/27 16:40
S25	2015	(rf$2id tag transponder) near10 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 07:20
S26	3	S25 and (simulat$4 emulat$4) near3 (plural$4 multipl$5 many several) near3 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:21
S27	76	S25 and (ticket) near20 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S28	123	(rf$2id tag transponder) near5 (send$3 transmit$4 communicat$4) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S29	0	S28 and (ticket) near20 (rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 07:23
S30	6758	(340/10.1,10.2,10.4,10.41,10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 07:24
S31	31	S30 and S28	US-PGPUB; USPAT	OR	ON	2012/08/28 07:24
S32	156	(rf$2id tag transponder card smart$2card ic chip) near5 (send$3 transmit$4 communicat$4) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:09
S34	32	S30 and S32	US-PGPUB; USPAT	OR	ON	2012/08/28 08:09
S35	1	S34 not S31	US-PGPUB; USPAT	OR	ON	2012/08/28 08:10
S36	1708	(rf$2id tag transponder) near5 (group near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:10
S38	138	S30 and S36	US-PGPUB; USPAT	OR	ON	2012/08/28 08:11
S39	156	(rf$2id tag transponder) near5 (group near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:11
S40	10	S30 and S39	US-PGPUB; USPAT	OR	ON	2012/08/28 08:12

S41	0	(rf$2id tag transponder) near5 (pre$2amble header) same (group near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:34
S42	304	(rf$2id tag transponder) near5 ((lot type group) near2 (id identification identi$6)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S43	31	S30 and S42	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S44	21	S43 not S40	US-PGPUB; USPAT	OR	ON	2012/08/28 08:35
S45	547	(rf$2id tag transponder) near5 (group near2 id)	US-PGPUB; USPAT	OR	ON	2012/08/28 08:41
S46	31	S30 and S45	US-PGPUB; USPAT	OR	ON	2012/08/28 08:41
S47	333	(rf$2id tag transponder) near5 ((lot type group) near2 (id identification identi$6 code)) near10 ((individual unique) near2 (id identification identi$6))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S48	37	S30 and S47	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S49	6	S48 not S43	US-PGPUB; USPAT	OR	ON	2012/08/28 08:52
S50	766	(rf$2id tag transponder) near5 (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:53
S51	48	S30 and S50	US-PGPUB; USPAT	OR	ON	2012/08/28 08:54
S52	17	S51 not S46	US-PGPUB; USPAT	OR	ON	2012/08/28 08:54
S53	110	(rf$2id tag transponder) near20 (send$4 transmit$4 communicat$4 signal$4) near5 (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S54	8569	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S55	24	S54 and S53	US-PGPUB; USPAT	OR	ON	2012/08/28 08:57
S56	1791	(340/10.4-10.42).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/28 09:00
S57	36	S56 and (group near2 (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:01
S58	32	S57 and (rf rf$2id tag transponder)	US-PGPUB; USPAT	OR	ON	2012/08/28 09:01

S59	397	(rf$2id tag transponder) near5 (group adj(code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S60	2	S56 and S59	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S61	23	S54 and S59	US-PGPUB; USPAT	OR	ON	2012/08/28 09:04
S62	5	(rf$2id tag transponder) near20 (group adj (code id)) near10 ((individual unique) adj (code id))	US-PGPUB; USPAT	OR	ON	2012/08/28 09:08
S63	13	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$ or US-20090243810-$ or US-20060181420-$ or US-20050253687-$ or US-20050258956-$ or US-20020175805-$ or US-20060145817-$ or US-20080109899-$ or US-20050066039-$).did. or (US-7307533-$ or US-5856788-$).did.	US-PGPUB; USPAT	OR	ON	2012/08/29 08:31
S65	12	S63 and (ident$7 identification id) near3 number	US-PGPUB; USPAT	OR	ON	2012/08/29 08:31
S66	4	S63 and (reader read reading interrogat$4) near10 search$4	US-PGPUB; USPAT	OR	ON	2012/08/29 08:47
S67	13	S63 and (reader read reading interrogat$4) near10 (signal$4 command transmit$4 send$4 communicat$4 search$4)	US-PGPUB; USPAT	OR	ON	2012/08/29 08:49
S68	13	(US-20090199206-$ or US-20070274242-$ or US-20040199784-$ or US-20090243810-$ or US-20060181420-$ or US-20050253687-$ or US-20050258956-$ or US-20020175805-$ or US-20060145817-$ or US-20080109899-$ or US-20050066039-$).did. or (US-7307533-$ or US-5856788-$).did.	US-PGPUB; USPAT	OR	ON	2012/08/29 11:39
S69	11	S68 and group	US-PGPUB; USPAT	OR	ON	2012/08/29 11:39
S70	473	(rf$2id tag transponder) near10 (stor$3 record$4 writ$4) near5 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/29 13:11
S71	445	(read reading communication transmit$4 transmission send) near5 order near20 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/29 13:12
S72	7	S70 and S71	US-PGPUB; USPAT	OR	ON	2012/08/29 13:12
S73	445	(read reading communication transmit$4 transmission send) near5 order near20 time near2 stamp	US-PGPUB; USPAT	OR	ON	2012/08/30 06:51
S74	501	(rf$2id tag transponder) near5 (stor$3 record$4 writ$4) near5 (time order) near5 (communicat$4 transmission transmit$4 send$4) near5 (read reader reading interrogat$4 scan$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 06:57
S75	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 06:58

S76	242	S75 and S74	US-PGPUB; USPAT	OR	ON	2012/08/30 06:58
S77	0	(stor$3 record$4 writ$4) near3 last near2 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4) near3 (read reader reading interrogat$4 scan$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:00
S78	6	(stor$3 record$4 writ$4) near3 last near2 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:00
S79	46	(stor$3 record$4 writ$4) near3 (tag transponder ic chip integrated card smart$2card) near5 (communicat$4) near3 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:01
S80	32	S79 and history near10 (time order last)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:02
S81	11	((tag transponder) near2 (rf$2id rf)) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near3 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:11
S82	54	(tag transponder) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near2 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:12
S83	23	S75 and S82	US-PGPUB; USPAT	OR	ON	2012/08/30 07:13
S84	119	(tag transponder chip ic card smart$2card rf$2id rf label) near3 (stor$3 record$4 writ$4) near3 (read reading interrogat$4 scan$4) near2 history	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S85	26	S75 and S84	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S86	4	S85 not S83	US-PGPUB; USPAT	OR	ON	2012/08/30 07:14
S87	27	indicat$4 near5 (tag transponder) near3 already near3 (read interrogat$4 scan$3)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:17
S88	3	S87 and indicat$4 near20 time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:24
S89	26	S87 and tim$3	US-PGPUB; USPAT	OR	ON	2012/08/30 07:24
S90	15	S87 and indicat$4 same time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:28
S91	17	S87 and (read$4 interrogat$4 scan$3) near5 time	US-PGPUB; USPAT	OR	ON	2012/08/30 07:28
S92	0	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4) near5 session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:37
S93	4	(read reader reading interrogat$4 scan$4) near15 (assign$4 allocat$4) near5 session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:37

S94	388	(read reader reading interrogat$4 scan$4) same session adj number	US-PGPUB; USPAT	OR	ON	2012/08/30 07:39
S95	25	(read reader reading interrogat$4 scan$4) same session adj number near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:39
S96	29	(read reader reading interrogat$4 scan$4) near15 session adj (number id identification identif$6 token) near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 07:53
S97	5	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token) near10 (tag transponder rf$2id)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:20
S98	89	(read reader reading interrogat$4 scan$4) near5 (assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:23
S99	11	S98 and (tag transponder card ic smart$2card chip) near10 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:24
S100	8577	(340/10.1-10.6).ccls.	US-PGPUB; USPAT	OR	ON	2012/08/30 10:30
S101	2	S100 and S98	US-PGPUB; USPAT	OR	ON	2012/08/30 10:30
S102	97	(read reader reading interrogat$4 scan$4) near5 (address$4 assign$4 allocat$4 send$4 transmit$4 provid$4 communicat$4) near5 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S103	2	S100 and S102	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S104	13	S102 and (tag transponder card ic smart$2card chip) near10 session adj (number id identification identif$6 token)	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31
S105	2	S104 not S99	US-PGPUB; USPAT	OR	ON	2012/08/30 10:31

EAST Search History (Interference)

<This search history is empty>

8/30/2012 3:34:11 PM
C:\Users\abee\Documents\EAST\Workspaces\Finkenzeller_12304653_Tag_Emulate_Plurality_Tags.wsp

UNITED STATES PATENT AND TRADEMARK OFFICE

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BIB DATA SHEET

CONFIRMATION NO. 7360

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/304,653	03/04/2009 RULE	340	2612	FINK3009/JEK

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Denny Brandl, Eching, GERMANY;

**** CONTINUING DATA ***************************

This application is a 371 of PCT/EP2007/005185 06/12/2007

**** FOREIGN APPLICATIONS ***************************

GERMANY 10 2006 027 200.5 06/12/2006

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

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Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
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TITLE

DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

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		US-			
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		EP 1 450 299 A1	08-25-2004	DAI NIPPON PRINTING CO., LTD.		
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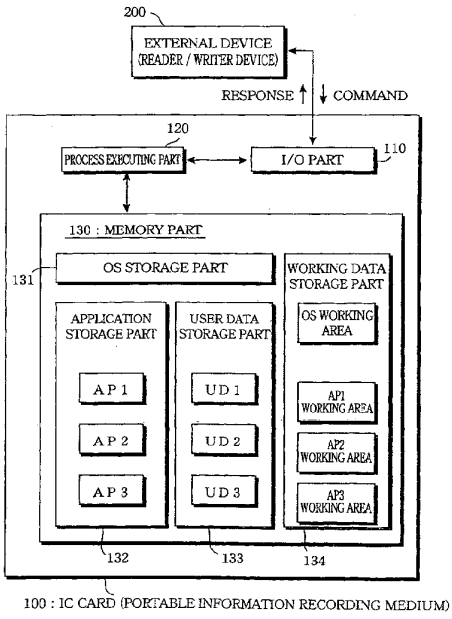
(54) PORTABLE INFORMATION RECORDING MEDIUM

(57) When in order to enable the use of a plurality of applications (AP1 to AP3) simultaneously, preparation commands, having identifiers attached, are provided according to the respective applications and working areas for the respective applications are secured inside a RAM (134). By providing a verification command having a specific identifier, a verification process concerning a specific application is performed and a verification result is stored in the corresponding application working area. This verification result is used until the completion of a communication session. To make a specific application execute a desired process, a process executing command that designates an identifier attached to the corresponding application is provided. Adequate security can be ensured and yet a series of linked processes can be performed smoothly while switching among a plurality of application programs in the same communication session.

Fig.1



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Description

TECHNICAL FIELD

[0001] This invention relates to a portable information recording medium and, in particular, relates to a portable information recording medium having a function of being connected as necessary to an external device and recording user data to be recorded in its interior and performing various processes in accordance with command-and-response interactions with the external device.

BACKGROUND ART

[0002] The recording capacities of portable information recording media have improved greatly with the progress of semiconductor circuit integration, and future demands are .anticipated in various fields, especially with IC cards and other portable information recording media having a built-in CPU. For example, an IC card with a built-in CPU has a function of being connected as necessary to an external device (reader/writer device) and executing specific processes in accordance with command-and-response interactions with this external device. Since the process that is executed inside the IC card when a certain command is provided is determined by an OS program or an application program installed in the IC card, dedicated application programs with processing functions for various applications are normally installed inside the IC card. For example, in a case where the same IC card is to be used as a hospital registration card and as a financial account card, both an application program for a hospital registration card and an application program for a financial account must be installed in the IC card. Thus, due to the recent significant improvements in the memory capacities incorporated in IC cards, multi-application IC cards, having a plurality of application programs installed in advance, are becoming popular. IC cards, equipped with a function of adding new application programs as necessary after issue, are also being used widely. For example, Japanese Laid-open Patent Publication No. 10-79000 discloses an IC card with a function of adding programs for upgrading, etc.

[0003] A major characteristic of a portable information medium with a built-in CPU is that an advanced form of security can be ensured. For example, in the case of a general IC card that is popularly used presently, a verification process is executed in the process of starting communication with an external device upon connection of the IC card with the external device. Normally, a verification step is performed in which a verification command with verification data is received from the external device, a judgment of the propriety of the provided verification data inside the IC card is conducted, and a verification result is stored in the internal memory of the IC card. According to the verification data provided from the external device, various verification results may be obtained, such as enabling of just reading of data inside the IC card, enabling of just adding of new data, or enabling of even rewriting of existing data. Thus normally, an arrangement is adopted wherein the above-described verification process is executed at a starting point of a communication session, the verification result is stored in the memory inside the IC card, and when various commands are provided from the external device, the verification result stored in the memory is referenced to judge whether or not the execution of a provided command is enabled, and a command is executed only when it has been judged that its execution is enabled. Since a RAM or other volatile memory is used as the memory for storing the verification result, when a single communication session is completed and the external device is disconnected, the verification result is erased from within the IC card. As the verification process is required at each communication session, adequate security can be secured even in a case of loss of the IC card, etc.

[0004] As mentioned above, with built-in CPU type portable information recording media, as represented by IC cards, the installation of a plurality of application programs in accordance with applications is becoming popular. It is thus predicted that the number of application programs that are installed in a single portable information recording medium will increase further in the future. Obviously, an application command provided from an external device is processed by one program among the plurality of application programs that are installed. Thus in providing an application command, prior preparation is necessary for specifying the application program that is to perform a process. Normally, this preparation is made by providing an application selection command, which includes information that selects a specific application.

[0005] For example, let assume the case where an IC card, in which both a hospital registration application program and a financial account application program are installed, is to be used at a hospital counter. In this case, it is necessary to carry out a preparation step after connection of the IC card to an external device installed at the hospital counter. In this preparation step, a selection command for selecting the hospital registration card application program is provided from the external device to the IC card so that such a selection state is set up and a verification process unique to the application is performed so that the verification result is stored in a memory (RAM) . After the selected state, in which the hospital registration card application is selected, has been set, the normal commands provided from the external device are all processed by the hospital registration card application that is in the selected state. As mentioned above, the enabling or disabling of the execution of each command is determined based on the verification result that is stored in the memory.

[0006] In order to secure an advanced degree of se-

curity in such a multi-purpose IC card, etc., as described above, arrangements must be made to perform a verification process according to each individual application. Thus with prior-art multi-purpose IC cards, etc., each time a new application is selected, a verification program concerning the selected application program must be performed. For example, let assume the case where a diagnosis and treatment record is to be written into an IC card as a hospital registration card and a diagnosis and treatment fee is to be paid using the IC card as a financial account card. In this case, after connecting the IC card to an external device installed at a hospital counter, first, a selection command for selection of the hospital registration card application program is provided from the external device to the IC card to set up the state in which the hospital registration card application is selected, and in continuation after the execution of a diagnosis and treatment record writing process, a selection command for selection of the financial account application program is provided from the external device to the IC card to set up the state in which the financial account application is selected and a process of writing the diagnosis and treatment fee payment information is executed. It is predicted that such a form of use in which a plurality of applications are used in the same communication session to perform a series of linked process will become more popular in the future.

[0007] However, with a prior-art portable information recording medium, a selection command must be provided each time an application is switched and a verification process concerning the application must also be performed each time. Thus, when a series of linked processes are to be performed by switching among a plurality of applications in the same communication session, the internal processing load of the portable information recording medium and the load of communication with an external device become excessive.

[0008] An object of this invention is thus to provide a portable information recording medium that enables adequate security to be ensured for each individual application and yet enable a series of linked processes to be performed while switching among a plurality of application programs in the same communication session.

DISCLOSURE OF INVENTION

[0009]

(1) The first feature of the present invention resides in a portable information recording medium having a function of being connected as necessary to an external device and performing command-and-response interactions with the external device to record user data to be recorded inside the medium and perform various processes, the portable information recording medium comprising:

an I/O part, communicating with the external device;

an OS storage part, storing an OS program;

an application storage part, storing a plurality of application programs;

a user data storage part, storing user data;

a process executing part, executing a command provided from the external device and returning an execution result as a response to the external device based on the OS program or the application programs; and

a working data storage part, used as a working area for the process executing part and securing at least an OS working area for storing working data for the OS program;

wherein when a preparation command including information designating an application program and a unique identifier to be attached to the designated application program is provided from the external device, the process executing part executes a process of securing an application working area for storing working data for the designated application program in the working data storage part , and a process of storing information defining a correspondence between the designated application program and the identifier to be attached thereto and information specifying the secured application working area in the OS working area, thereby setting up a state in which use of the designated application program is enabled; and

wherein when a process executing command for making a specific application program designated by an identifier execute a specific process is provided from the external device, the process executing part executes the specific process in accordance with the specific application program and using an application working area secured for the specific application program.

(2) The second feature of the present invention resides in a portable information recording medium according to the first feature:

wherein when a verification command for performing verification concerning an application program designated by an identifier is provided from the external device, the process executing part executes a verification process in accordance with the verification command and a process of storing a verification result in an application working area secured for the application program; and

wherein when a process executing command for making the application program designated by the identifier execute a specific process is provided from the external device, the process executing part executes a process of referencing the verification result stored in the application working area secured for the application program, judging whether or not an execution of the process executing command is enabled, and if a judgment that the execu-

tion is enabled is made, executing the specific process in accordance with the application program.

(3) The third feature of the present invention resides in a portable information recording medium according to the second feature:

wherein when a verification command concerning a specific application program is provided from the external device, the process executing part stores information as a verification result in the application working area, the information indicating a list of commands enabled for execution by the specific application program.

(4) The fourth feature of the present invention resides in a portable information recording medium according to the first to the third features:

wherein, as information which specifies an application working area secured in the working data storage part, a head address of the area and a size of the area are stored in the OS working area.

(5) The fifth feature of the present invention resides in a portable information recording medium according to the first to the fourth features:

wherein when a preparation command is provided from the external device, the process executing part examines contents of an application program stored in the application storage part and secures an application working area of a size that is in accordance with an examination result.

(6) The sixth feature of the present invention resides in a portable information recording medium according to the fifth feature:

wherein a size of an application working area for an application program is determined based on information concerning variables and arrays used in the application program.

(7) The seventh feature of the present invention resides in a portable information recording medium according to the first to the sixth features:

wherein when an inquiry command, which makes an inquiry concerning a newly useable identifier, is provided from the external device, the process executing part performs a process of examining the OS working area to recognize identifiers in defined and undefined states and returns recognized identifiers as a response to the external device.

(8) The eighth feature of the present invention resides in a portable information recording medium according to the first to the seventh features:

wherein the OS storage part, the application storage part, and the user data storage part are arranged from non-volatile memories and the working data storage part is arranged from a volatile memory.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a block diagram showing the condition where an IC card 100 of an embodiment of this invention is connected to an external device 200.

Fig. 2 is a diagram showing an example of a series of commands provided from the external device to the IC card according to the present invention.

Fig. 3 shows diagrams of examples of information written into an OS working area by the execution of preparation commands (1) and (2) shown in Fig. 2.

Fig. 4 is a diagram showing an example of lists of commands enabled for execution that are written into the application working area as verification results.

Fig. 5 is a diagram showing an example of an inquiry command for making an inquiry concerning identifiers that are available at the present point in time and examples of responses made in accordance with this command.

BEST MODE FOR CARRYING OUT THE INVENTION

[0011] This invention shall now be described based on an illustrated embodiment. Though this invention is widely applicable to general portable information recording media, an example where this invention is applied to an IC card, which is the most popularly used portable information recording medium, shall be described.

<<< §1. Basic Arrangement of IC Card of the Invention >>>

[0012] Fig. 1 is a block diagram showing the condition where an IC card 100 (portable information recording medium) of an embodiment of this invention is connected to an external device 200. External device 200 is a device that is generally called a reader/writer device and is normally used upon connection to a personal computer, etc. IC card 100 comprises an I/O part 110 for communicating with external device 200, a process executing part 120 executing various processes within the IC card, and a memory part 130 storing various data and programs. The communication between IC card 100 and external device 200 is carried out by command-and-response interactions. That is, when a certain command is sent from external device 200 to IC card 100, this command is received by I/O part 110 and transmitted to process executing part 120. Process executing part 120 interprets and executes this command and returns the processing result as a response to I/O part 110. This response is sent from I/O part 110 to external device 200. Process executing part 120 performs execution of the provided command based on a program stored inside memory part 130, and in accompaniment with the

execution of this command, accesses data that are stored in memory part 130 as necessary. As shown in the Figure, memory part 130 is arranged from the four storage parts of an OS storage part 131, an application storage part 132, a user data storage part 133, and a working data storage part 134.

[0013] The above-described respective components are components defined in regard to functional aspects for the purpose of description of this invention and do not correspond to actual hardware components. In actuality, process executing part 120 is realized by a CPU or other logical device embedded inside the IC card. Needless to say, process executing part 120 is not a component that can be realized by a CPU or other hardware alone but is a component that is realized under the premise of operations based on programs stored inside memory part 130. Memory part 130 is realized by a memory, such as a ROM, RAM, EEPROM, etc. In the case of the embodiment illustrated here, OS storage part 131 is realized by a ROM, application storage part 132 and user data storage part 133 are realized by EEPROM's, and working data storage part 134 is realized by a RAM. Though the memory configuration for putting this invention into practice does not necessarily have to be that of the present embodiment, in the case of a general type portable information recording medium without a built-in power supply (in other words, in the case of a portable information recording medium of a type that receives the supply of electricity from the external device 200 upon connection to external device 200), OS storage part 131, application storage part 132, and user data storage part 133 must be arranged as non-volatile memories so that the data can be held even after disconnection from external device 200. Also, at least user data storage part 133 must be arranged as a rewritable non-volatile memory (EEPROM). For practical use, application storage part 132 is also arranged as a rewritable non-volatile memory so that new application programs can be installed as necessary. Meanwhile, working data storage part 134 is arranged as a rewritable volatile memory (RAM) from the standpoint of ensuring security. With this arrangement, when IC card 100 is disconnected from external device 200 and carried, only the data inside working data storage part 134 are erased.

[0014] The information stored in the respective storage parts that make up memory part 130 shall now be described. An OS program that describes the basic operations of IC card 100 is stored in OS storage part 131. Presently, JavaCard, MULTOS, are popular as OS programs for IC cards, and process executing part 120 performs basic operations based on such an OS program. Meanwhile, a plurality of application programs are stored in application storage part 132. In the case of the illustrated embodiment, application storage part 132 is provided in a memory area inside an EEPROM and the specifications enable arbitrary addition of application programs after issuing of the IC card. The example of Fig. 1 illustrates a case where three application programs AP1, AP2, and AP3 are already installed. User data to be recorded in IC card 100, such as personal data, transaction data, etc., concerning a user who is the owner of this IC card 100 (and including data concerning the issuer of the IC card), are stored in user data storage part 133. With the illustrated example, user data UD1, UD2, and UD3, used in application programs AP1, AP2, and AP3, respectively, are stored separately and independently. Obviously, and though not shown in the illustrated example, common user data that are used in common by a plurality of applications may also be stored in addition to the above.

[0015] Working data storage part 134 is an area that is used as a working area for process executing part 120. If a command provided from external device 200 is an OS command, process executing part 120 executes this command based on an OS program inside OS storage part 131, if a command provided from external device 200 is an application command, this command is executed based on specific application program inside application storage part 132, and the respective execution results are returned as responses to external device 200. In all cases, working data storage part 134 is used as the working area. As shall be described later, when process executing part 120 executes an OS program, an OS working area inside working data storage 134 is used as the working area, and when process executing part 120 executes a predetermined application program, an application working area secured for the application inside working data storage part 134 is used as the working area. Here, whereas the OS working area is secured automatically inside working data storage part 134 by an initial setting operation performed at the point at which IC card 100 is connected to external device 200 and a communication session is started, as shall be described below, each individual application working area is secured by a preparation command being provided from external device 200.

<<< §2. Basic Operations of the IC Card of the Invention >>>

[0016] The basic operations of the IC card shown in Fig. 1 shall now be described. IC card 100 is a typical portable information recording medium and is normally carried by a user. With the present embodiment, since the power for IC card 100 is supplied from external device 200 as mentioned above, power is not supplied to IC card 100 while it is carried. However, since OS storage part 131, application storage part 132, and user data storage part 133 are arranged from non-volatile memories, the data recorded in these respective storage parts will not become lost. On the other hand, since working data storage part 134 is arranged from a volatile memory (RAM), the data in working data storage part 134 become lost when the card is carried.

[0017] As mentioned in the previously described ex-

ample, when recording of a diagnosis and treatment data is to be carried out and payment in regard to a financial account is to be performed, this IC card 100 is connected to external device 200 to perform communication between the two. At the start of communication, power is supplied from external device 200 to IC card 100, the CPU in the IC card 100 is reset, process executing part 120 executes an initial routine of the OS program stored in OS storage part 131 and performs the task of preparing an environment for the communication session. The OS working area inside working data storage part 134 is secured at this point. After the environment for performing a communication session has thus been prepared, interactive communication, wherein when a command is provided from external device 200, a corresponding response is returned from IC card 100, is repeated. When a single communication session is completed, IC card 100 is disconnected from external device 200 and is carried by the user again. At this point, all of the contents of working data storage part 134, which is arranged from a volatile memory (RAM), become lost. Though a verification result is recorded inside working data storage part 134 as mentioned above, this verification result is cleared for each communication session, and this is suitable for ensuring security.

[0018] When an OS command is provided from external device 200, process executing part 120 performs a process of executing this command based on the OS program inside OS storage part 131 and returning a corresponding response to external device 200. If the provided command is an application command, process executing part 120 performs a process of executing this command based on one of the application programs inside application storage part 132 and returning a corresponding response to external device 200. However when an application command is to be executed, preparation concerning the application must be carried out in advance.

[0019] In the case of a general, prior-art IC card, the preparation concerning a specific application was carried out by means of a selection command that selects the specific application from external device 200. With the prior-art preparation method based on such a selection command, only one of the application programs could be put in the prepared state, and a new selection command had to be provided when switching to another application program. Moreover as mentioned above, since when a new selection command for switching to an application is provided, a verification process concerning the application must be performed each time, when a series of linked processes are to be performed by switching among a plurality of applications in the same communication session, the internal processing load of IC card 100 and the load of communication with external device 200 become excessive.

[0020] The basic concept on which the present invention is based is that by putting a plurality of application programs in a prepared state simultaneously, defining identifiers respectively for each of the individual applications in the prepared state, and adding the identifiers respectively to each of the individual commands provided from external device 200, one application is specified from among the plurality of applications that are put in the prepared state simultaneously and the provided command is processed in accordance with the specified application program. With this invention, in order to maintain a plurality of applications simultaneously in the prepared state, separate working areas are secured inside working data storage part 134 for the respective individual applications and the verification results of the respective applications are stored respectively in these working areas.

[0021] Specific operations based on such a basic concept shall now be described with an example that uses the series of commands (1) to (10) shown in Fig. 2. Of the illustrated commands, (1) and (2) are preparation commands (OS commands) for putting individual application programs into the prepared state, (3) to (8) are verification commands (application commands) for performing verification concerning each individual application program, and (9) and (10) are process executing commands (application commands) for executing specific processes using the individual application programs. Here, for convenience of description, let assume the example where, as shown in Fig. 1, three application programs AP1, AP2, and AP3 are stored inside application storage part 132, with AP1 being a hospital registration card application, AP2 being a financial account application, and AP3 being a gas station service application. This IC card 100 is thus used for the three applications of hospital registration card, financial account card, and gas station service card.

[0022] Here, consider a case where the user of this IC card 100 is to write a diagnosis and treatment record into the IC card as a hospital registration card and is to pay diagnosis and treatment fees using the IC card as a financial account card at a hospital counter. In this case, with a prior-art IC card, after connecting the IC card to an external device installed at the hospital counter, first, a selection command for selection of the hospital registration card application program is provided from the external device to the IC card to set up the state in which the hospital registration card application is selected, and in continuation after the execution of a diagnosis and treatment record writing process, a selection command for selection of the financial account application program is provided from the external device to the IC card to set up the state in which the financial account application is selected and a process of writing the diagnosis and treatment fee payment information is executed. Here, each time a selection command is provided, a verification process determined according to the corresponding application must be performed. On the other hand with the present invention, as shown in Fig. 2, after first providing preparation commands (1) and (2) to put the two applications AP1 and AP2 necessary for

the series of processes in the prepared states simultaneously, verification commands (3) to (5) for application AP1 and verification commands (6) to (8) for application AP2 are provided to perform the respective verification processes for these applications and the results are stored in working data storage part 134. In this state, applications AP1 and AP2 are already put simultaneously in the preparation completed and verification completed states. By then providing specific process executing commands (9) and (10) to the individual applications, the respective application programs are made to execute the specific processes.

[0023] Each of the preparation commands (1) and (2) shown in Fig. 2 contains information designating a specific application program and a unique identifier to be attached to the designated application program. For example, preparation command (1) comprises the command name, "PREPARE," which indicates the command as being a preparation command, the information (for example, the application name) that designates application AP1 (hospital registration card application), and the unique identifier, "Ch1," which is to be attached to this designated application program. When such a preparation command is provided, process executing part 120 performs a process of securing, inside working data storage part 134, an application working area for storing working data for the designated application and storing information defining the correspondence between the designated application program and the unique identifier to be attached thereto and information specifying the secured application working area in the OS working area to set up a state in which use of the specified application program is enabled.

[0024] Specifically, when preparation command (1) is provided, an AP1 working area is secured as the working area for application AP1 inside working data storage part 134 as shown in Fig. 1. Furthermore, information defining the correspondence of application AP1 and the unique identifier, "Ch1," to be attached thereto and information specifying the secured AP1 working area are written into the OS working area (which is already secured in the environment preparation stage of the communication session that is carried out immediately after connection of IC card 100 to external device 200 as mentioned above) inside working data storage part 134. Likewise, when preparation command (2) is provided, an AP2 working area is secured as the working area for application AP2 inside working data storage part 134. Furthermore, information defining the correspondence of application AP2 and the unique identifier, "Ch2," to be attached thereto and information specifying the secured AP2 working area are written into the OS working area inside working data storage part 134.

[0025] Fig. 3 shows diagrams of examples of the information written into the OS working area by the execution of the above-described preparation commands (1) and (2). The information shown in Fig. 3(a) is the information written by preparation command (1) and the information shown in Fig. 3 (b) is the information written by preparation command (2). With these examples, as the information defining the correspondence of an application program and a unique identifier to be attached thereto, an identifier and the head address of the corresponding application program are written in an associated manner. For instance, with the example of Fig. 3 (a), by storing the identifier, "Ch1," and the address, "Add11," (the head address of application program AP1 stored inside application storage part 132) in an associated manner, it is indicated that application program AP1 corresponds to the identifier "Ch1." Also as the information specifying the application working area secured inside working data storage part 134, the head address of the area and the size of the area are stored. For instance, with the example of Fig. 3(a), the working area for AP1 is specified by the head address, "Add12," of the application AP1 working area (head address of the area secured inside working data storage part 134) and the size, "2kB," of this area. The information shown in Fig. 3(b) is the same type of information concerning application AP2.

[0026] Consequently, by the execution of preparation commands (1) and (2), a state is set up in which two application working areas (the AP1 working area and the AP2 working area; the AP3 working area shown in Fig. 1 is not secured in the operation example shown in Fig. 2) are secured inside working data storage part 134 and the information shown in Fig. 3 are stored in the OS working area. By the execution of such preparation commands, the use of two applications AP1 and AP2 are enabled simultaneously. Thus unlike the selection commands used in prior-art IC cards, the preparation commands of the present invention can enable the use of a plurality of application programs simultaneously. In actually using the individual application programs, the following verification process must be carried out.

[0027] The verification commands (3) to (8) shown in Fig. 2 are verification commands that are generally used in prior-art IC cards as well and the actual verification process that is executed by the use of these commands is the same as the verification process carried out with prior-art IC cards. However, a characteristic of a verification command of this invention is that a specific identifier is contained within the command and a specific application program, which is subject to the verification process, is designated by this specific identifier. For example, all of the verification commands (3) to (5) contain the identifier, "Ch1," indicating that these verification commands are commands concerning application program AP1, and all of the verification commands (6) to (8) contain the identifier, "Ch2," indicating that these verification commands are commands concerning application program AP2. With this invention, since a plurality of application programs are put in the use-enabled state simultaneously, when providing a verification command for an application, an identifier for specifying one of the plurality of application programs in the use-enabled

state becomes necessary.

[0028] Verification command (3) is a command for checking whether or not a password provided from external device 200 (the data, "Password," which is contained in the command) matches the password concerning application AP1 that is stored in IC card 100 (stored among user data UD1 in user data storage part 133), and the verification result that is obtained by the execution of the verification process in accordance with this verification command is written into the AP1 working area. Specifically, a password matched/unmatched result (in a case where a plurality of passwords are stored in IC card 100, a result indicating with which of the passwords matching is realized) is stored as the verification result.

[0029] Meanwhile, verification commands (4) and (5) are a command pair for executing a single verification process by means of two commands. First, verification command (4) is a command that causes the generation of an arbitrary random number inside IC card 100 and requests the returning of this random number as a response to external device 200. Process executing part 120 performs a process of generating a random number for application AP1 in accordance with the identifier, "Ch1, " that is contained in this command and returning this random number as a response to external device 200. The random number that is generated at this point is recorded in a certain location (for example inside the AP1 working area) . At external device 200, a process of encrypting this returned random number in accordance with a predetermined algorithm and providing a verification command (5), which contains the obtained encrypted data, "AuthData," to IC card 100 is performed. The "AuthData" in verification code (5) shown in Fig. 2 is thus encrypted data prepared based on the random number that was obtained as a response to verification command (4). Upon receiving verification command (5), process executing part 120 encrypts the priorly generated random number by an algorithm (contained in application program AP1) equivalent to the encryption carried out at external device 200, and verifies whether or not the result matches the encrypted data, "AuthData," contained in verification command (5). Obviously, this verification result is also written into the AP1 working area.

[0030] Thus by the execution of verification commands (3) to (5), the verification process concerning application AP1 is carried out and the verification result is stored in the AP1 working area inside working data storage part 134. Verification commands (6) to (8) are the same types of verification commands concerning application AP2, and the result of the verification process based on these verification commands is stored inside the AP2 working area inside working data storage part 134. Though in the example shown in Fig. 2, after preparation commands (1) and (2) concerning the two applications are executed, verification commands (3) to (5) concerning application AP1 are executed and then verification commands (6) to (8) concerning application AP2 are executed, as long as the condition of "executing the preparation command and thereafter executing the verification command" is satisfied for each specific application, the order of the respective commands can be changed freely. For example, verification command (6) may be executed immediately after verification command (3) or verification commands (3) to (5) may be executed immediately after preparation command (1). Since each command contains an identifier, which application a command is for can be identified for each command by means of this identifier.

[0031] When preparation commands (1) and (2) and verification commands (3) to (8) of Fig. 2 are thus completed, the preparation process and verification process for the two applications AP1 and AP2 are completed, and the environment for using both applications is fully prepared. In this state, process executing commands for these two applications can be provided from external device 200 and executed. However, since a plurality of applications are made useable simultaneously, each process executing command is made to contain an identifier for specifying the application that is to execute the command. When a process executing command for executing a specific process is provided to an application program thus designated by an identifier, process executing part 120 references the verification result stored in the application working area that is secured for the corresponding application, judges whether or not the execution of the provided process executing command is enabled, and if it is judged that execution is enabled, uses the corresponding application to execute the specific process.

[0032] For example, since process executing command (9) of Fig. 2 contains the identifier, "Ch1," process executing part 120 executes this command based on application AP1. In this process, first the verification result stored in the AP1 working area (the verification result obtained by the execution of verification commands (3) to (5)) is referenced and whether or not the execution of this command is enabled is judged. For example, in a case where the information indicating either success or failure of verification is stored as the verification result (specifically, in a case where information indicating the matching or mismatching of a password, etc., is recorded), the judgment that the execution of the command is enabled is made only if information indicating success of verification is stored. If a positive judgment is made, the corresponding command is executed and a response is returned accordingly, while if a negative judgment is made, a response indicating error is returned. Specifically, process executing command (9) is a command for reading the data of a record, "Record 2," inside a file, "File 3," and with this command, the corresponding data among user data UD1 inside user data storage part 133 are read and returned as a response to external device 200.

[0033] Meanwhile, since process executing com-

mand (10) of Fig. 2 contains the identifier, "Ch2," process executing part 120 executes this command based on application AP2. In this process, first the verification result stored in the AP2 working area (the verification result obtained by the execution of verification commands (6) to (8)) is referenced and whether or not the execution of this command is enabled is judged. The command is executed only if a positive judgment is made. Specifically, process executing command (10) is a command for renewing a record, "Record 1," inside a file, "File 2," by data read immediately priorly, and the contents of the corresponding record among user data UD2 inside user data storage part 133 are rewritten with data read by process executing command (9) and a response indicating success of rewriting is returned to external device 200.

[0034] Thus if the IC card of the present invention is used in a manner such as described above, in a case where a diagnosis and treatment record is to be written into the IC card as a hospital registration card and a diagnosis and treatment fee is to be paid using the IC card as a financial account card, by putting both diagnosis card application AP1 and financial account application AP2 in use-enabled states and verification-completed states and then providing process executing commands that designate either application by means of identifiers, a desired application can be made to execute a desired process. Though an example where two process executing commands (9) and (10) are provided is illustrated with the example shown in Fig. 2, as long as the commands are process executing commands concerning application AP1 or AP2, a plurality of commands can be provided in continuation subsequently. Moreover, the application targeted by a command can be designated by an identifier and a verification process does not have to be performed anew in switching between applications. Thus by the IC card according to the present invention, a form of use, wherein a series of linked processes are executed using a plurality of applications in a single communication session, can be implemented smoothly.

<<< § 3. Modification Examples of the Portable Information Recording Medium of the Invention >>>

[0035] A basic embodiment to which this invention is applied to an IC card was described above. Here, modification examples of this invention shall be described.

(1) As mentioned above, with this invention, when a verification command concerning a certain application program is provided from an external device, process executing part 120 executes a verification process based on this verification command, stores the verification result in an application working area concerning the corresponding application, and when a process executing command concerning the application is provided thereafter, the verification result is referenced to determine whether or not the execution of the command is enabled. Here, what should be noted is that the verification result that is stored in the application working area is not necessarily "a two-choice result of success of verification or failure of verification." That is, for practical use, a plurality of types of verification results may be stored in accordance with access rights held by external device 200. For example, a first password, which provides just the authority to read data, a second password, which provides the authority to read data and add data, and a third password, which provides full authority, including that to rewrite data, may be determined in advance and mutually different verification results may be stored in accordance with which password is used in the verification command. In this case, if verification by the first password is carried out, a verification result indicating that only the reading of data is enabled is written, if verification by the second password is carried out, a verification result indicating that the reading of data and the adding of data are enabled is written, and if verification by the third password is carried out, a verification result indicating that all processes are enabled is written.

With the example shown in Fig. 4, information, which indicates lists of commands enabled for execution by individual application programs subject to verification, is stored as verification results in application working areas. With this example, information indicating the three commands of "READ RECORD (command for reading the data of a single record)," "UPDATE RECORD (command for updating the data of a single record) , " and "WRITE RECORD (command for adding data to a single record) " is stored as the verification result in the application AP1 working area, and information indicating the two commands of "READ RECORD" and "UPDATE RECORD" is stored as the verification result in the application AP2 working area. By storing such a list of executable commands as the verification result, when an arbitrary command is provided, whether or not the execution of this command is enabled can be judged immediately.

(2) With this invention, when a preparation command concerning a specific application program is provided, an application working area for this application is secured inside working data storage part 134 by process executing part 120. However, the size of the working area that should be secured normally differs with each individual application, and there are applications that require a working area of large size as well as applications that suffice with a working area of small size. Thus for practical purposes, it is preferable to make process executing part 120 examine the contents of the application programs stored in application storage part 132 and secure application working areas of sizes that are

in accordance with the examination results. For example, when preparation command (1), shown in Fig. 2, is provided, process executing part 120 examines the contents of application program AP1 stored in application storage part 132 and secures an AP1 working area of a size that is in accordance with this program. Specifically, variable definition statements, array declaration statements, etc., inside the programs are recognized and the necessary sizes are determined by a predetermined algorithm in accordance with the variables and arrays used.

(3) Though with the above-described embodiment, an example using character strings, such as "Ch1, " "Ch2," etc., as identifiers was described, any form of data may be used for the identifiers as long as they are defined uniquely according to the respective applications. Since in putting this invention to practice, a verification command or a process executing command for each application must contain an identifier for specifying the application, an identifier made up of short a data as possible is preferable for practical use. For example, in a case of an IC card designed to enable use of a maximum of four applications simultaneously, the identifiers, "00, "01," "10, " and "11," which are made up of two bits, will suffice.

Also in putting this invention into practice, mutually different and unique identifiers must be attached to a plurality of applications that are simultaneously put in a use-enabled state. Thus in order to prevent a preparation command, which would attach the same identifier to a plurality of different applications, from being issued erroneously from external device 200, it is preferable to enable inquiry using an inquiry command to be performed prior to the issuing of the preparation command. That is, external device 200 is enabled to provide an inquiry command (OS command) that makes an inquiry concerning a newly useable identifier, and process executing part 120 is enabled, upon receiving such an inquiry command, to perform a process of examining the OS working area and thereby recognizing defined and undefined identifiers and returning the recognized identifiers as a response to external device 200.

Fig. 5 is a diagram showing specific examples of such an inquiry command and corresponding responses. With this example, the inquiry command is an OS command made up of the character string, "MANAGE CHANNEL." By preparing a routine that processes such an inquiry command in a part of the OS program, process executing part 120 can be made to perform a process of performing the above-described examination in accordance with this routine and returning a response. Fig. 5 shows an example where defined identifiers (Ch1, Ch2) are returned as a response and an example where identifiers in the undefined state (Ch3 to Ch8; this example is premised on the eight identifiers of Ch1 to Ch8 being prepared in advance as identifiers) as a response. After receiving such a response, external device 200 can provide a correct preparation command, with which already-defined identifiers will not be defined redundantly, in consideration of the contents of the response.

(4) With the above-described embodiment, after providing a preparation command for a specific application to prepare for use of the application, a verification command concerning the application is provided to execute a verification process and whether or not the executing of a process executing command for the application is enabled is judged based on this verification process result. However, in a form of use with which verification is not necessary for the execution of a process, the provision of a verification command is not necessary, and for an application for which preparation by the preparation command has been completed, a process executing command may be provided and the process may be executed immediately.

(5) Process executing part 120 in the above-described embodiment executes various processes based on the OS program stored in OS storage part 131 or any of the application programs stored in application storage part 132. Here, since a preparation command for putting a certain application program in a use-enabled state cannot be executed by the application program itself that is the subject of the preparation command, a preparation command is normally executed by an OS program (depending on the case, a preparation command may be executed by another application program). On the other hand, a verification command or other process executing command may be executed by an OS program or by an application program. However, in the case of a general IC card, a form of use, wherein an OS program is already installed at the time of issue of the card and the respective application programs are added as suited after issue, is adopted in many cases, and application programs are thus higher in the degree of freedom than the OS program. Thus for practical use, it is preferable to design so that the actual processing parts of verification commands and other processing execution commands are executed by the respective application programs while the OS program serves the role of handing over these command to the respective application programs.

INDUSTRIAL APPLICABILITY

[0036] As described above, the portable information recording medium according to the present invention enables adequate security to be ensured for each individual application and yet enable a series of linked proc-

esses to be performed smoothly while switching among a plurality of application programs in the same communication session. The portable information recording medium of the invention is thus optimal for uses, in which a plurality of different application programs are made to operate on the same, single IC card for financial service processing, credit service processing, medical service processing, etc., and can be used in various industrial fields.

Claims

1. A portable information recording medium (100) having a function of being connected as necessary to an external device (200) and performing command-and-response interactions with the external device to record user data (UD1 to UD3) to be recorded inside the medium and perform various processes, the portable information recording medium comprising:

an I/O part (110) , communicating with the external device (200);
an OS storage part (131), storing an OS program;
an application storage part (132), storing a plurality of application programs (AP1 to AP3);
a user data storage part (133), storing user data (UD1 to UD3);
a process executing part (120), executing a command provided from the external device (200) and returning an execution result as a response to the external device based on said OS program or said application programs (AP1 to AP3); and
a working data storage part (134), used as a working area for said process executing part (120) and securing at least an OS working area for storing working data for said OS program;

wherein when a preparation command including information designating an application program (AP1 to AP3) and a unique identifier (Ch1, Ch2) to be attached to the designated application program is provided from the external device (200), the process executing part (120) executes a process of securing an application working area for storing working data for the designated application program in said working data storage part (134), and a process of storing information defining a correspondence between the designated application program and the identifier to be attached thereto and information specifying the secured application working area in said OS working area, thereby setting up a state in which use of the designated application program is enabled; and

wherein when a process executing command for making a specific application program (AP1 to AP3) designated by an identifier (Ch1, Ch2) execute a specific process is provided from the external device (200), the process executing part (120) executes said specific process in accordance with said specific application program and using an application working area secured for said specific application program.

2. The portable information recording medium (100) as set forth in Claim 1:

wherein when a verification command for performing verification concerning an application program (AP1 to AP3) designated by an identifier (Ch1, Ch2) is provided from the external device (200), the process executing part (120) executes a verification process in accordance with said verification command and a process of storing a verification result in an application working area secured for said application program; and

wherein when a process executing command for making said application program (AP1 to AP3) designated by said identifier (Ch1, Ch2) execute a specific process is provided from the external device (200), the process executing part (120) executes a process of referencing said verification result stored in the application working area secured for said application program, judging whether or not an execution of said process executing command is enabled, and if a judgment that the execution is enabled is made, executing said specific process in accordance with said application program.

3. The portable information recording medium (100) as set forth in Claim 2:

wherein when a verification command concerning a specific application program (AP1 to AP3) is provided from the external device (200), the process executing part (120) stores information as a verification result in the application working area, said information indicating a list of commands enabled for execution by said specific application program.

4. The portable information recording medium (100) as set forth in any of Claims 1 to 3:

wherein, as information which specifies an application working area secured in the working data storage part (134), a head address (Add12, Add22) of said area and a size of said area are stored in the OS working area.

5. The portable information recording medium (100) as set forth in any of Claims 1 to 4:

wherein when a preparation command is provided from the external device (200), the process executing part (120) examines contents of an application program (AP1 to AP3) stored in the application storage part (132) and secures an application

working area of a size that is in accordance with an examination result.

6. The portable information recording medium (100) as set forth in Claim 5:

wherein a size of an application working area for an application program (AP1 to AP3) is determined based on information concerning variables and arrays used in the application program.

7. The portable information recording medium (100) as set forth in any of Claims 1 to 6:

wherein when an inquiry command, which makes an inquiry concerning a newly useable identifier (Ch3 to Ch8) , is provided from the external device (200), the process executing part (120) performs a process of examining the OS working area to recognize identifiers in defined and undefined states and returns recognized identifiers as a response to the external device.

8. The portable information recording medium (100) as set forth in any of Claims 1 to 7:

wherein the OS storage part (131), the application storage part (132), and the user data storage part (133) are arranged from non-volatile memories and the working data storage part (134) is arranged from a volatile memory.

Fig.1

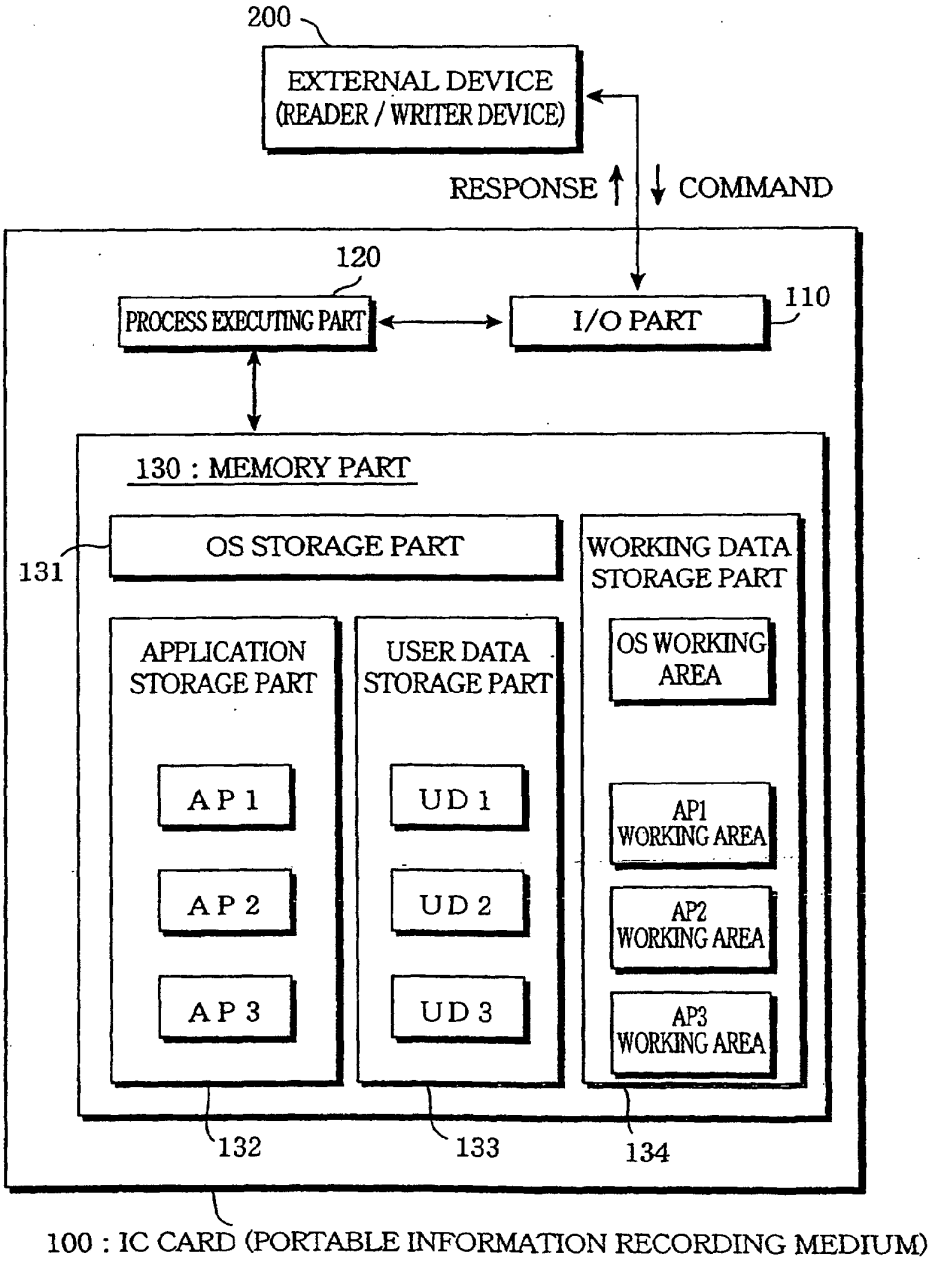


Fig.2

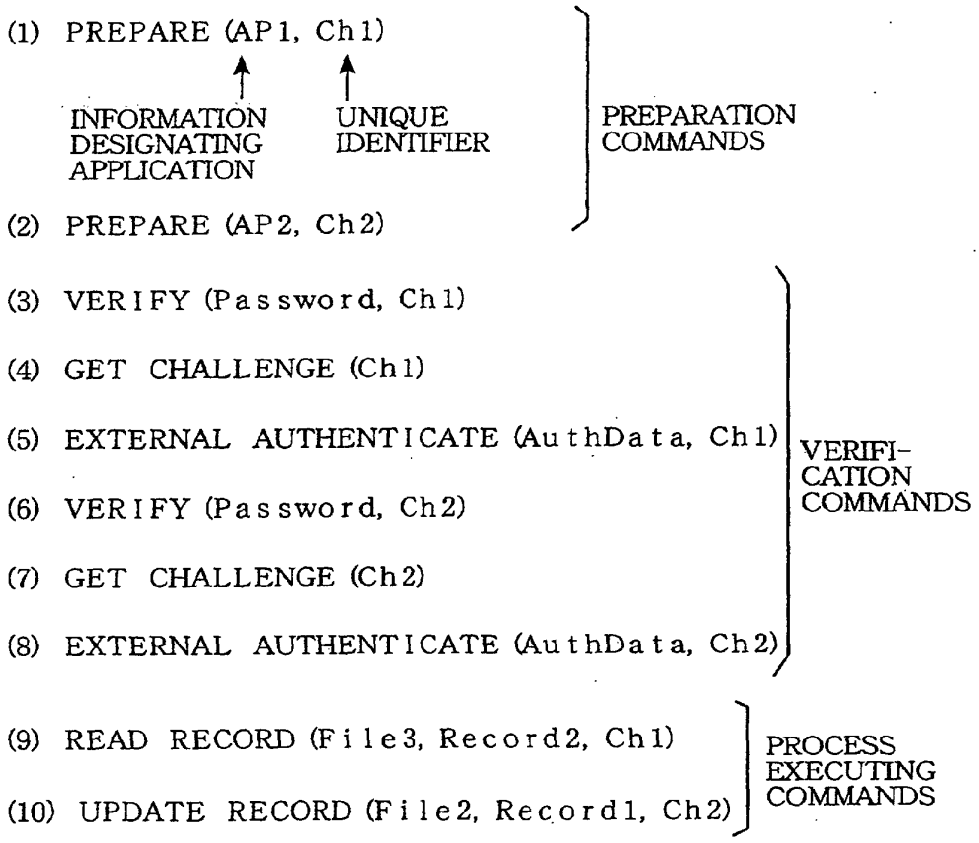


Fig.3

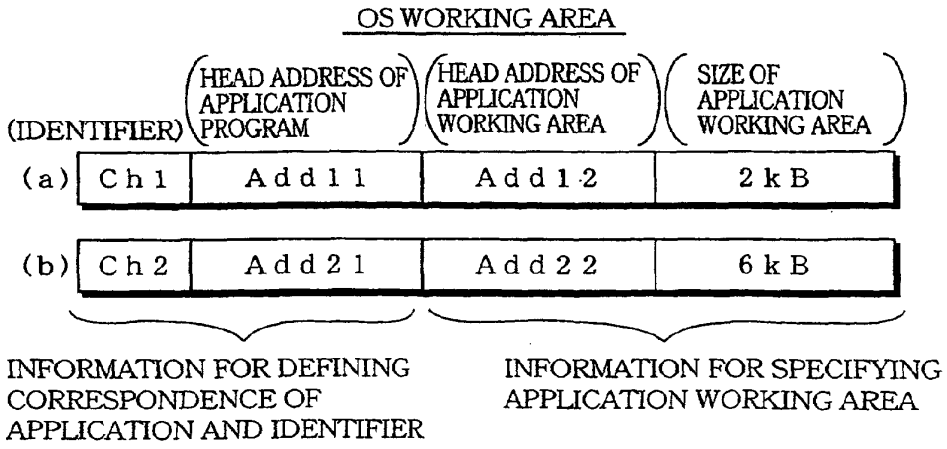


Fig.4

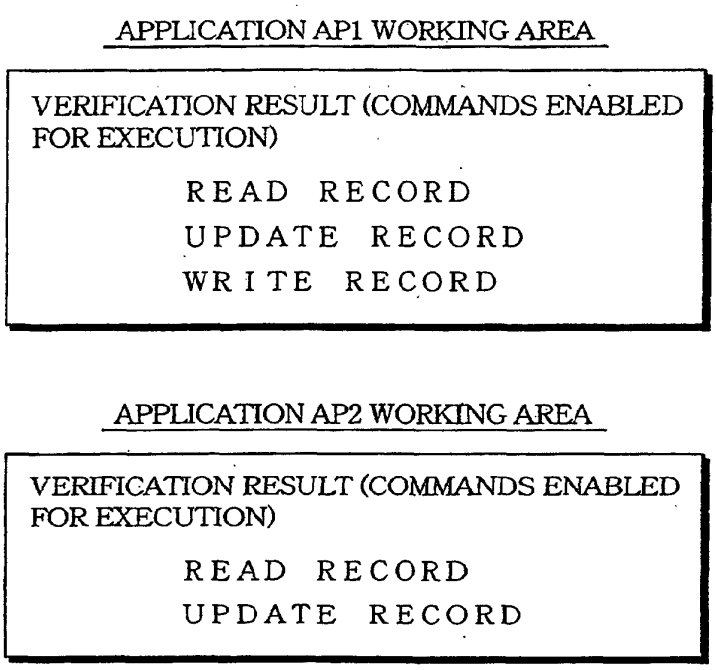
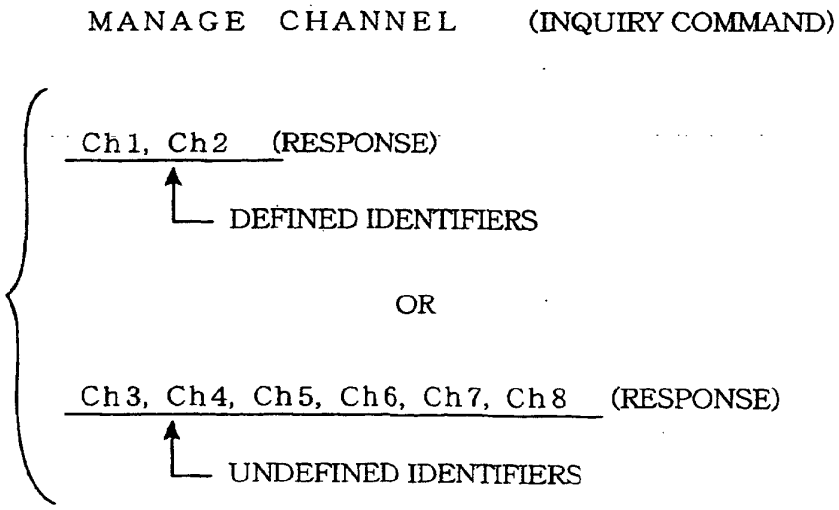


Fig.5



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Kokai Jitsuyo Shinan Koho	1971-2003	Jitsuyo Shinan Toroku Koho	1996-2003

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-256460 A (Sharp Corp., Nippon Telegraph And Telephone Corp.), 21 September, 2001 (21.09.01), Full text; all drawings & EP 1139223 A2 & US 2001/27511 A1	1-8
A	JP 2001-147997 A (Hitachi, Ltd.), 29 May, 2001 (29.05.01), Full text; all drawings (Family: none)	1-8
A	JP 10-116329 A (Nihon Denki Telecom System Kabushiki Kaisha), 06 May, 1998 (06.05.98), Full text; all drawings (Family: none)	1-8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

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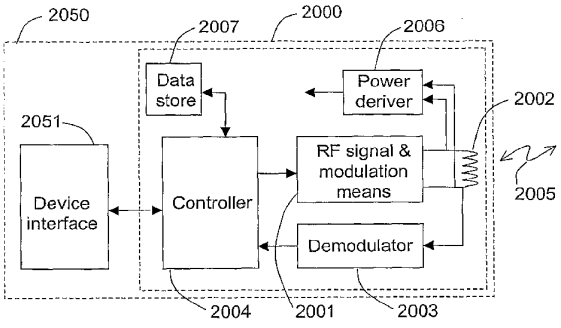
Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i)) for all designations*

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,*

[Continued on next page]

(54) Title: MULTI-TAG EMULATOR



(57) Abstract: The invention provides both a system, device and method for emulating a plurality of RF data storage devices in a single device, for example a hand held device such as a mobile phone. The system comprises a means for emulating a plurality of RF data storage devices each having a different identifier, control means for controlling the transmission simultaneously or sequentially of two or more of the identifiers in response to receipt of a signal from a reader, and means for transmitting simultaneously or sequentially two or more of the said identifiers. In one embodiment the transmission of the identifiers emulates the sequential transmission of two or more identifiers in accordance with a collision avoidance protocol. Alternatively or additionally the transmission of the identifiers emulates the simultaneous or sequential transmission of two or more different identifiers in accordance with a collision detection protocol. Preferably each of the identifiers comprises a different modulation sequence or pattern and the transmitted identifiers are generated by combining at least part of the modulation sequence or patterns of the data storage devices.

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MULTI-TAG EMULATOR

The invention relates to tags for example as used in radio-frequency identification (RFID), and in particular concerns an apparatus and method for emulating a series of co-located RFID tags. The term 'RFID' or 'RFID system' as used herein should be understood to include both traditional RFID systems, in which an RFID tag supplies data to an RFID reader, systems such as near field communication (NFC) systems and other systems which are for the storage and retrieval of data and/or commands via the use of radio frequency fields or signals. Likewise the term 'RFID tag' or 'tag' as used herein should be understood, where the context permits, to include transponders and NFC devices in tag-mode or data storage devices in similar form or with similar function; and the term 'RFID reader' or 'reader' as used herein should be understood, where the context permits, to include transceivers and NFC devices in reader-mode or similar devices or devices with similar function.

The growth and diversity of radio-frequency identification (RFID) applications is progressing rapidly and now includes near field communication (NFC) systems. Existing RFID system concepts, based on isolated and/or single reader and tag functionality, do not necessarily provide the optimum system level solution for an ever-increasing diversity of application areas. Many of these emerging application areas require multiple co-located RFID tag functionalities to exist within an isolated RFID device such as a transport ticket, or within a hand held device such

as a mobile phone or personal digital assistant (PDA) or the like. An example of such an application area is the emulation of multiple mass-transport RFID tickets by a hand held device in such a way that the ticket information contained within a hand held device can be read by a mass-transport RFID reader in exactly the same way as an individual or series of individual conventional mass-transport RFID/contactless tickets are read.

RFID applications often conform to a designated standard or protocol, for example ISO/IEC 14443, ISO/IEC 15693, ISO/IEC 18092 and ISO/IEC 21481. These standards or protocols are usually designed so that if two or more RFID tags are simultaneously within range of a reader, a data or communications collision will occur when the tags transmit data simultaneously in response to a signal from the reader. Readers are then capable of following a method to distinguish the different RFID devices using anti-collision methods.

Several technical problems need to be addressed to realise multiple co-located RFID tags in a single device or apparatus.

A solution to this technical problem could involve the implementation of separate RFID functionalities, each with its own antenna, within the same hand held device. In this case each of the separate RFID functionalities would perform according to it's designated standard or protocol and so cater for co-located responses to a reader, just as if the RFID functionalities were physically separate. However, close proximity of the antennas will result in interference between the antennas.

This effect is especially acute for proximity or vicinity coupled systems where the coupling mechanism is magnetic. A possible solution to this problem would involve either positioning the antennas at mutual magnetic nulls, or including an enable/disable function so that each antenna would be disabled when not in use. The former would have the difficulty of the null being moved by external influence, and the latter would never be completely disabled due to parasitics in components. These solutions also result in increased complexity, cost and size.

Another solution to the above mentioned technical problem could involve the user interface of the hand held device (mobile phone/PDA for example) being adapted to allow the user to select a single tag (for example a train ticket) from multiple tags stored within the device when required, and then to use a common RFID circuit and antenna means to transmit the selected tag identification and/or other data relating to the tag or application to a reader. This solution, however, is of little or no practical use when the user is faced with a congested environment or with making a time critical RFID/contactless /wireless transaction.

It is known to implement single RFID tag functionality within a hand held device, for example EP 1424657A1 discloses an electronic RFID ticket implemented within a mobile telecommunications device (a mobile phone is shown), using the existing microprocessor, memory, coder/decoder, display and power supply of the mobile device with additional software and hardware.

Anti-collision protocols are also known, for example as described in US 5365551. In this earlier patent the units that transmit colliding signals are all physically separate from each other. This document discloses a protocol for uniquely identifying a plurality of transceivers that simultaneously respond to a commander or base station using a common communication medium. If more than one of the transceivers broadcasts at the same time an erroneous message is received, which causes the commander station to broadcast a command causing each transponder to select a random number which it then uses as its arbitration or identification number. By broadcasting requests for identification to various subsets of the full range of arbitration numbers and checking for error-free response, a commander station can determine the arbitration number of every transponder. Consequently, a commander station can communicate individually with each transponder once they have been identified.

According to an aspect of the present invention there is provided an RFID system comprising means for emulating a plurality of RF data storage devices each having a different identifier, control means for controlling the transmission simultaneously or sequentially of two or more of the said identifiers in response to receipt of a signal from a reader, and means for transmitting simultaneously or sequentially two or more of the said identifiers.

The present invention solves the technical problem of implementing multiple co-located RFID tags in a single device by emulating conformance to or compliance with collision detection or collision avoidance methods/protocols in such a way

that signals from apparently separate RFID devices, as seen by the RFID reader, actually emanate from, or are coupled from, the same antenna on the same device. Tag emulations are carried out within one or more of: a microprocessor, microcontroller, reduced instruction set computer (RISC), state machine or the like, contained within the single device or where the device is part of a host system or larger device within the microprocessor, microcontroller or other control means within the larger device or host system. These emulations provide controlling influence over the functionality within the device which is used to transmit data in response to receipt of an RF signal.

Preferably the transmission of the identifiers emulates the sequential transmission of two or more different identifiers in accordance with a collision avoidance protocol and/or the simultaneous or sequential transmission of two or more different identifiers in accordance with a collision detection protocol.

Preferably each of the identifiers comprises a different modulation sequence or pattern and the transmitted identifiers are generated by combining at least part of the modulation sequence or pattern corresponding to the data storage devices.

Preferably the transmitted identifier is generated by combining at least part of the modulation sequence or patterns of a selected group of sequences or patterns corresponding to a set of data storage devices.

In preferred embodiments the simulated signal modulation sequence or pattern comprises the summation of at least part of the modulation sequences or patterns of the identifiers.

Each data storage device being emulated may comprise an RFID tag or device incorporating RFID tag functionality, preferably the RFID tags or devices comprise RFID tickets.

In preferred embodiments the system comprises a single antenna for transmitting the identifiers.

The present invention also contemplates a device comprising a system as referred to in the above aspect of the invention. For example the device may be a mobile phone, PDA or other hand held device.

According to another aspect of the invention there is provided a method of operating an RFID system. This method comprises the steps of: emulating a plurality of RFID tags, the tags each having a different identifier associated therewith; and simultaneously or sequentially transmitting the identifiers by the device. This method is preferably automated and capable of implementation in an RFID system independently of user input, that is to say the method is implemented without user intervention, for example without the user having to manually select a particular RFID tag.

Preferably the method further comprises a step for receiving the transmitted identifiers and detecting a plurality of RFID tags by identifying the received identifiers as a collision event between two or more tags. The method may further comprise the step of implementing a collision avoidance and/or a collision detection protocol to enable the emulated RFID tags to be read by a reader.

Preferably the said data storage devices comprise contactless tickets.

In general, RFID devices may include any of RFID readers, tags and NFC devices:

An RFID reader may transmit an RF signal which may be modulated by the reader in accordance with data and/or commands stored within the reader. The reader will also receive RF signals (either modulation of its own previously generated signal, a new RF signal or a modulated new RF signal). The reader may derive power from such a received signal. It may demodulate the received RF signal and respond to the received RF signal in accordance with any data and/or instructions contained within such an RF signal and/or data stored within the reader. Example RFID readers are described in various international standards, ISO/IEC 14443, ISO/IEC 15693.

An RFID tag, when in the vicinity or range of a suitable RF signal will receive the RF signal and where necessary demodulate that RF signal. The tag may also derive a power supply or additional power supply from the received RF signal. This is particularly the case where the tag does not have its own power supply. The tag will respond to a received RF signal in accordance with any data and/or instructions contained within such an RF signal and/or data stored within

the tag itself. The response may be either modulation of a new RF signal or modulation of the received RF signal (via load modulation) or transmission of a new RF signal. Example RFID tags are described in various international standards, ISO/IEC 14443, ISO/IEC 15693.

An NFC device comprises both RFID reader and RFID tag functionality within the same device or apparatus. The function of the NFC device depends on the mode of operation and the status of the apparatus (referred to as 'initiator' and 'target' in the standards). When in target mode (or tag mode) the NFC device acts in a similar fashion to the RFID tag described above. When in initiator mode (or reader mode), the NFC device initiates or supplies an RF signal. Examples of NFC devices are described in ISO/IEC 18092 and ISO/IEC 21481.

For the avoidance of doubt the present invention may be implemented in a device or system comprising RFID tag functionality or NFC device functionality, but not necessarily a device or system comprising all the functionality of an RFID or NFC device. The present invention may also be implemented in a dedicated device in standalone form (either hand held or free standing) or comprised within a larger device or host device/system comprising other functionality, for example a mobile communications device, PDA, personal computer, laptop, games console or vending machine etc. Such apparatus, system or devices may comprise a single integrated circuit or alternatively the different functionalities may be provided by or implemented in separate component parts of separate integrated circuits. In embodiments where the RFID or NFC device or functionality is integrated within a larger device functions may be shared between the NFC or RFID device and the

larger device, for example the NFC or RFID may not have its own memory and may instead use memory provided within the larger device.

Embodiments of the present invention are contemplated where multiple RFID tags are emulated within a device such as a mobile phone. However, the present invention also contemplates embodiments in dedicated devices, for example, an RFID transport ticket containing functionality capable of emulating more than one ticket, a patient data storage system in which data from multiple patients is stored (each tag corresponds to a patient chart or medication/care profile). It will be understood by persons skilled in the art that many other systems, devices and methods can be advantageously designed incorporating the present invention.

It will be understood that when functioning to emulate one or more RFID tags, apparatus of the present invention will communicate with an RFID reader or an NFC device which may be in standalone form (either hand held or free standing) or comprised or integrated within a larger device or host device/system, for example a mobile or fixed communications device or system, computer, ticket inspection machine, transport access mechanism or gate etc.

Further features and advantages of the invention will become apparent from the following description of preferred embodiments of the invention, given by way of examples only, which are made with reference to the accompanying drawings.

Figure 1 is a block diagram, of an RFID reader of a known type;

Figure 2 is a block diagram of the reader of Figure 1 incorporated within a larger device or system;

Figure 3 is a block diagram of an RFID tag of a known type;

Figure 4 is a block diagram of a larger device or system, incorporating an RFID tag as shown in Figure 3;

Figure 5 is a block diagram of an NFC device of a known type;

Figure 6 is a block diagram of a larger device or system, incorporating an NFC device of the type shown in Figure 5;

Figure 7 is a schematic time domain representation of NFC passive communication between NFC devices;

Figure 8 is a schematic time domain representation of NFC active communication between NFC devices;

Figure 9 shows an example of an RFID reader circuit of a known type;

Figure 10 shows an example of an RFID tag circuit of a known type;

Figure 11 shows an example of an NFC device circuit of a known type;

Figure 12 shows an example of a circuit of part of a phase lock loop of a known type;

Figure 13 is a schematic representation of a plurality of RFID tags simultaneously transmitting to an RFID reader;

Figure 14 shows a first example in the vicinity of and of a modulation signalling method of a known type where data collisions occur and are detected;

Figure 15 shows a second example of a modulation signalling method of a known type where data collisions occur and are detected;

Figure 16 shows a third example of a modulation signalling method of a known type where data collisions occur and are detected;

Figure 17a shows a fourth example of a signalling method of a known type where data collisions occur and are detected;

Figure 17b shows a fifth example of a signalling method of a known type where data collisions occur and are detected;

Figure 18 shows a first example of a collision avoidance method of a known type;

Figure 19 shows a second example of a collision avoidance method of a known type;

Figure 20 is a block diagram of elements used in a device according to an embodiment of the present invention;

Figure 21a shows an example modulation signal representing simultaneous transmission of a data bit 1 and a data bit 0 by the device of Figure 20 when emulating data collisions in protocol that uses the modulation signalling method of Figure 14;

Figure 21b shows a second example modulation signal representing simultaneous transmission of a data bit 1 and a data bit 0 by the device of Figure 20 when emulating data collisions in a protocol that uses the modulation signalling method of Figure 15 or 16, and also an example where a data collision can be represented by sending incorrect data bits within a multi-byte data packet;

Figure 22 shows an example modulation signal representing a data collision for a pulse position transmission method, and also shows an example active carrier on one bit period representing data collision;

Figure 23 shows an example where collision avoidance is used by the device of Figure 20 with a time-slot method of the type illustrated in Figure 18;

Figure 24 shows an example where collision avoidance or where data collisions are forced, with a response-time-jitter method;

Figure 25 is a flow diagram of an example embodiment of operation of apparatus of the invention.

Examples of RFID readers, RFID tags, and NFC devices according to various embodiments of the present invention will now be described with reference to the drawings. For the purpose of best describing the example embodiments, reference is first made to the drawings of Figures 1 to 19 which show known elements of and illustrate known methods implemented in known types of RFID/NFC devices.

Figure 1 shows an example RFID reader 100 of a known type comprising an RF signal generating means 101, an antenna 102 connected to the signal generating means and a demodulation means 103. The RF signal generating means 101 generates an RF signal that is fed to antenna 102, which causes a magnetic field represented by the symbol 105 to be generated in the vicinity of the reader 100. A reader control means 104 connected to the signal generation means 101 and demodulation means 103 may or may not cause the RF signal generating means 101 to modulate the generated RF signal. An RFID tag or NFC device in tag-mode within range of the magnetic field 105 will respond to signals from the reader 100, in accordance with the protocol of the reader/tag or NFC device, in such a way that a modulated signal from the tag or NFC device is present at the reader antenna 102

and then demodulated by reader demodulator 103. Data output from reader demodulator 103 is fed to the reader control means 104. The activity or functionality or operation of the reader will be determined by the control means 104 in accordance with the data so obtained. Control means may be, for example, a microprocessor, microcontroller, state machine or RISC processor. It will be understood that the reader control means 104 may further comprise a user interface or the like.

Figure 2 shows an example of reader 100 from Figure 1 incorporated within a larger device or system 200. The reader 100 operates in the same manner as described for Figure 1, but in this case reader control means 104 is further connected to a device interface 201 so that the activity or functionality or operation of the reader 100 or larger device 200 may be determined by the data obtained from the demodulated RF signal by the demodulator 103. Device interface 201 has connections, not shown, to other functionalities within larger device or system 200.

Figure 3 shows an example RFID tag 300 of a known type comprising a control 304 which is connected to an antenna coil 306 through an RF modulator 303, on a signal transmission side, and an RF demodulator 301 on a signal receiving side. The control 304 may be for example a RISC processor, state machine, microcontroller or microprocessor. The control 304 is further connected to a data storage means 305 comprising a suitable form of volatile and/or non-volatile memory (for example EEPROM). When for example a reader 100 of the type described in Figure 1 or Figure 2 causes a magnetic field 307 to be generated in the

region of the coil 306 of the tag a voltage is generated across coil 306. Tag 300 may or may not contain a power deriving means 302 for providing power to the elements of the tag, that is to say the tag may be active or passive. In embodiments having a power deriving means (for example passive tags) the voltage across the coil 306 can be used to power all or part of tag 300. If the magnetic field 307 generated by a reader is modulated, then the tag demodulation means 301 demodulates the signal and outputs the demodulated data to the tag control 304. The tag control 304 may be responsive to data from the tag demodulation means 301, power from the power deriving means 302, or from some other internal or external stimulus.

The tag control 304 may also cause data to be read from or written to the data storage means 305. The tag control 304 may similarly respond to data, power or other stimulus and cause data, which might be from the data storage means 305, to be sent to the tag modulation means 303. The tag modulation means 303 when receiving data from the tag control 304 causes, according to that data, a modulated signal to be generated, via the magnetic field 307, at the device originally generating the field, the reader 100 Figure 1 in this example. The tag control 304 may further comprise a user interface means or the like as previously described in relation to the reader of Figure 2.

Figure 4 shows a larger device or system 400, incorporating the tag 300 of Figure 3. A device interface 401 interacts with tag 300 via the tag control means 304. The device interface 401 has connections, not shown, to other functionalities

within the larger device or system 400, and these other functionalities may incorporate some or all of data storage means 305 and tag control 304. Power deriving means 302 may, if present, supply power to some or all of larger device 400.

Figure 5 shows an example NFC device 500 of a known type. As previously mentioned an NFC device can operate in two modes, as either a reader or a tag, referred to herein as 'reader-mode' and 'tag-mode' respectively. In this example, when operating in reader-mode, RF signal and modulation means 501, antenna 502, demodulation means 503 and NFC control means 504 operate to provide the same or similar functions as these equivalent elements 101, 102, 103, and 104 as described for Figure 1, that is to say to provide an RF transmission signal transmitted as magnetic field 505 which has similar characteristics to the field 105 of Figure 1. In this example, when operating in 'tag-mode', antenna 502 and demodulation means 503 provide the same or similar functions as antenna 306 and tag demodulation means 301 in Figure 3, and in a similar manner, RF signal and modulation means 501 provides the same or similar function as tag modulation means 303 in Figure 3. In addition, power deriving means 506, NFC control means 504 and data storage means 507, have similar functionalities to the equivalent functionalities 302, 304 and 305 as described in relation to the tag of Figure 3.

For particular applications, NFC devices can be controlled to operate as either an initiator (reader-mode) or a target (tag-mode). When an NFC device is controlled to be an initiator, the NFC device operates as a reader in a similar manner as the

reader of Figure 1 previously described. When an NFC device is controlled to be a target, the NFC device operates in a similar manner as the tag in Figure 3, that is to say in a listening mode waiting for a magnetic field to be generated in its vicinity by an RFID reader or another NFC device in initiator mode.

NFC devices function within an active protocol or a passive protocol. Where a passive protocol is used, the device operating as an initiator maintains its RF signal throughout the duration of all communications sequences; and two command-response example sequences are shown in Figure 7. In the drawing of Figure 7 the continuous upper block represents the communication period in which the initiator is continuously transmitting an RF signal/field, from 'Initiator RF field on' on the left hand side to 'Initiator RF field off' on the right hand side. The two unshaded areas (1st Initiator command and 2nd Initiator command) represent the supply of first and second command data from the initiator. The two unshaded shorter blocks below the continuous block represent receipt of response data from the target in response to the first and second initiator command signals (Target response 1 and Target response 2 respectively). Where an active protocol is used, the device operating as an initiator switches-off its RF field when it finishes sending a command, then a responding target switches on its own RF field to send its response information back to the initiator; and examples of two command-response sequences are shown in Figure 8. The drawing of Figure 8 is similar to that of Figure 7 in that the blocks on the upper time line are representative of the initiator transmitting to the target and the blocks on the lower time line are representative of the target responding. The shaded areas represent the time at the

start and end of the transmission that does not contain any command or response data, for example where the RF field is un-modulated.

An NFC device may be set up to operate in either reader-mode or tag mode as default. The change in mode of operation may be due to the operation of a larger device, receipt of an externally generated RF signal by the NFC device or as a result of some instruction received from within the NFC device or larger device. Preferably the NFC device will be set to operate in tag-mode as default as this has the advantage of saving power within the device or larger device in which it is incorporated.

Figure 6 shows a larger device or system 600, incorporating an NFC device 500. A device interface 601 interacts with NFC device 500 via its NFC device control means 504. NFC device 500 operates in the same way as described for NFC device 500 in Figure 5. Device interface 601 has connections, not shown, to other functionalities within larger device or system 600, and these other functionalities may incorporate some or all of data storage means 507 and NFC device control means 504. Power deriving means 506 may, if present, supply power to some or all of larger device 600.

Reader 100 in Figure 1, tag 300 in Figure 3 or NFC device 500 in Figure 5 may be in a suitable standalone form (either hand held or free standing), for example incorporated in a mass transit ticket.

The larger device or system 200 of Figure 2, 400 of Figure 4 or 600 of Figure 6 may comprise or be part of a host device or system, for example a mobile or fixed communications device, PDA, personal computer, computer, vending machine, electronic wallet, ticket inspection machine, transport access mechanism or gate etc. When forming part of a larger device, an RFID reader, RFID tag or an NFC device may be included as a discrete unit, be integrated within the electronic circuitry of the larger device or alternatively use parts of the electronic circuitry and parts within the larger device.

Known methods to generate and/ or modulate RF signals used to provide RFID reader, RFID tag or NFC device functionality consist of three main methods and these are referred to herein as 'carrier generation', 'load modulation' and 'carrier interference'. These three methods will now be described in more detail below. Apparatus below refers to readers and/or tags as the context permits.

Apparatus operating in accordance with the carrier generation method generates and emits an independent RF carrier signal, which may or may not be modulated. The carrier generation method would usually, but not exclusively, be used to construct an RFID reader apparatus and its use for an RFID reader is explained here with reference to Figure 9 which is one example of RFID reader circuitry. Microcontroller 916 is designed to carry out the functionality of reader control means 104 in Figure 1. The microcontroller 916 controls operation of RF signal generation means 957 and in this example the RF signal generation means 957

generates an RF carrier signal at 13.56MHz. Microcontroller 916 provides modulation control signals 959 to the differential driver means 958.

The modulation control signals 959 control the amplitude of the RF carrier signal that the differential driver means provides to the antenna circuitry. The differential driver means 958 outputs complimentary pulses using techniques well known to persons skilled in the art. The antenna circuitry comprises a plurality of capacitors 901, 902, 950 and 951 and a coil 907 which form a tuned circuit and function to reduce unwanted carrier harmonics, however the main function of coil 907 is to act as an antenna to emit the modulated RF carrier signal. Microcontroller 916 will typically use modulation control signals 959 sent to the differential driver means 958 to alter the signal level, the modulation depth, relating to binary data desired to be sent according to predetermined patterns relating to a '1' or a '0'. Where an un-modulated RF carrier signal is desired, the modulation control signals 959 control the differential driver means 958 to output full amplitude RF carrier signal.

Capacitors 955 and 956 limit the amplitude of the signal input to the demodulator 950 so as to avoid over-volt damage to the demodulator. The demodulator 950 is used to demodulate signals from an external device within reception range, an RFID tag for example, where modulated signals are coupled to the antenna 907. Demodulator 950 outputs demodulated signals in binary form to microcontroller 916.

In this example of the carrier generation method the RF signal generation means 957 is constructed to generate the RF signal by the well-known technique of sine synthesis. RF signal generation means 957 provides a pulse-width modulated (PWM) or a pulse-density modulated (PDM) digital signal to the differential driver means 958. The PWM or PDM signal is generated from a code stored on a Read Only Memory (ROM). The ROM data is fed to a Shift Register (SR), the output of which forms the PWM or PDM serial data stream. The ROM code is generated by a sine synthesis technique well known to persons skilled in the art. It is well understood by those skilled in the art that the sine synthesis PWM or PDM code could be generated by alternative means such as a processor means running a pre-configured algorithm. The PWM or PDM data stream controls differential driver means 958 such that complimentary pulses are output in the most advantageous way to minimize unwanted RF signal frequencies being emitted. System configurations and requirements may facilitate the advantageous removal of capacitors 950 and 951 where the nature of the signals from differential driver means 958 maintains the avoidance of infringing emissions regulations. If the sine synthesis technique were not used, then to conform to emissions regulations, additional filtering circuitry would be required, for example additional inductors and capacitors at signal nodes 952 and 953.

Apparatus operating in accordance with the load modulation method modulates the impedance of the signal reception circuitry; there is no active modulation signal. The load modulation method would usually, but not exclusively, be used to construct RFID tag apparatus and its use for an RFID tag is explained here with

reference to Figure 10 which is one example of RFID tag circuitry. An externally generated magnetic field induces an ac voltage across the signal reception circuitry comprising capacitor 1012 and antenna 1006 formed as a coil inductor. An RFID reader or NFC device in reader-mode generates the externally generated magnetic field for example from an RF signal fed to an antenna. The induced voltage is fed to power deriving means 1002, which in this example consists of diode 1008, energy storage capacitor 1009, and over-voltage protection means 1010. Over-voltage protection means 1010 operates to stop voltages on either positive or negative half-cycles of the induced ac voltage from rising to a level where damage could occur to any part of RFID tag 1000. The output of power deriving means 1002 feeds a dc supply voltage to all circuitry within RFID tag 1000 requiring a supply voltage. The state-machine 1004, which performs the same function as the tag control means 304 in Figure 3, sends a modulation signal 1011 to transistor 1003. The modulation signal 1011 consists of binary data to be sent according to predetermined patterns relating to a '1' or a '0'. The binary data to be sent may for example be determined according to one or more of: a control sequence arranged to operate within state machine 1004, data contained within electrically erasable programmable read only memory (EEPROM) 1005, data received by RFID tag 1000 as modulation to the RF signal and demodulated by tag demodulation means 1001. The modulation signal 1011 is fed to transistor 1003, which has a known on-resistance, and so when the modulation signal switches-on transistor 1003, an impedance is switched across the signal reception circuitry. The impedance change caused by transistor 1003 is coupled to the nearby circuit (not shown in Figure 10) emitting the RF signal in the RFID reader or NFC device. This coupled

impedance change causes a signal variation that is demodulated by a demodulator within the RFID reader or NFC device.

Apparatus operating in accordance with the carrier interference method simulates the load modulation method by using an active signal generated to be at the same frequency as, and at a fixed phase relation to, the incoming carrier signal. The carrier interference method would usually, but not exclusively, be used to construct NFC device apparatus and its use for an NFC device is explained here with reference to Figure 11 which is one example of NFC device circuitry.

When the NFC device is operating in reader-mode it would be usual to use the carrier generation method as described for Figure 9 and this is shown in this example as items 1132, 1122 and 1148 being equivalent in function to items 916, 907 and 950 in Figure 9 respectively and also circuit elements 1102 and 1104 being equivalent to item 958 in Figure 9. In addition although not illustrated in Figure 11 an RF signal generation means would be present having the same function as 957 in Figure 9.

In this example the RF signal fed to the antenna is in digital square-wave form and so when comparing with the reader circuitry of Figure 9, additional filtering components (inductors 1160 and 1161 and capacitors 1162 and 1163) are required to reduce harmonics of the carrier so that emissions regulations are met.

The circuitry of Figure 11 that is used in tag-mode to operate the carrier interference method will now be described.

The apparatus 1100 includes a micro-controller 1132, a modulator function 1102, a driver function 1104, an antenna 1122 and a phase-locked loop 1149 comprising in this embodiment a voltage controlled oscillator (VCO) 1108, a phase detector 1110, a loop filter and preferably a sample and hold circuit and in this example the filter and sample and hold functions are combined and shown as 1118. Although shown separately the modulator and driver functions 1102 and 1104 may be comprised within the same component. The apparatus will also have access to, whether within itself (for example as part of the microcontroller) or as part of a separate component or larger device, a data store 1134.

The apparatus operates with a power supply (not represented). Such power supply may be specific to the apparatus itself, it may be dependent on the mode of operation or the apparatus may use a pre-existing power supply within a larger device. For example when in tag-mode, the apparatus may derive power from its own internal power supply, from the power supply in a larger device of which it is a part or from an externally generated RF field or signal.

A reader device (not shown, but would be for example an RFID reader or second NFC device, in reader mode) interacts with the apparatus 1100 by employing available radio-frequency signals used in RFID applications and NFC systems. For example in this embodiment RF signals at 13.56 MHz are used. The apparatus

receives an RF signal from such an external reader device when the apparatus is within range of the external reader device.

The VCO 1108 will continuously generate an internal RF signal. The phase-locked loop 1149, which is preferably a second order loop, comprises means by which the internally generated RF signal is brought into phase with the received (externally generated) RF signal. In a preferred embodiment, the VCO 1108 is connected to the phase detector 1110 via a composite loop filter and hold function 1118. The phase detector 1110 detects the difference in frequency and phase between the VCO generated RF signal and the received RF signal. A signal is then sent from the phase detector to the loop filter resulting in an adjustment to the voltage generated by such loop filter. This in turn adjusts the phase and frequency of signal generated by the VCO. This process is continuously repeated to ensure the VCO signal and external RF signal match.

The phase lock loop process will continue until an instruction to modulate and transmit the internally generated RF signal is received from the microprocessor. This might occur once phase locking between the external RF signal and VCO generated signal has been detected by microprocessor 1132. Alternatively, this might occur once apparatus is ready to transmit and modulate, for example at a time interval prescribed by operating protocols such as ISO 14443.

As will be understood by persons skilled in the art combinations of other known techniques could be used to provide the functionality of the phase lock loop 1149.

The apparatus 1100 is then arranged to modulate and transmit the VCO generated RF signal in accordance with the operation of the apparatus in reader-mode and as described above and also with reference to Figure 9, and the relevant description thereof above should be understood to apply.

The modulated VCO generated signal 1142 on transmission from antenna 1122 is set to cause destructive or constructive interference or a combination of both with the received RF signal 1140. The external reader device (not shown) demodulates this interference-modulated signal in exactly the same way that it would demodulate a coupled load-modulated signal from, for example, an RFID tag.

Different types of modulation or interference or combinations of modulation/interference are possible for the transmission of the VCO generated RF signal, e.g. in-phase only causing constructive interference, out-of phase only causing destructive interference, a combination of in- and out-of phase, partially in- and/or out- of phase or a combination of partially in- and/or out- of phase.

In one alternative embodiment, the apparatus includes a modulation controller 1106. The modulation controller 1106 controls the amplitude of the modulated carrier signal or modulated VCO generated signal in accordance with either the proximity of the external reader device, and/or the characteristic of the received RF signal or and/or the proximity of the data storage device. Where the modulation controller uses detection of external signal strength this can be implemented by

providing an amplitude-leveling loop having a signal strength detector block 1130 which captures a sampled measurement of the incoming RF signal strength. The strength information can be used, within the micro-controller 1132 and modulation controller 1106, in conjunction with other calibration or predictive data if required, to set and control the modulation depth, with the modulator 1102 and the driver 1104, to a desired value using for example a modulation controller algorithm.

The clamp 1120 is used to reduce the risk of high voltages destroying chip functionality. In circumstances where high voltages might or do occur, for example when the apparatus is in the field of another RF reader device, current is diverted through the clamp thereby preventing high voltages from affecting the chip functionality.

The composite loop filter and hold function 1118 is detailed further in Figure 12.

When activated the VCO 1108 continuously generates an internal RF signal. Likewise the phase detector 1110, whilst active, continually detects the phase difference between the internally generated signal and any external RF signal and signals the loop filter to increase voltage.

The composite loop filter and hold function 1118 is placed into hold mode by opening a switch 1116 of Figure 12. When open, the filter can be approximated as a floating integrator whose capacitive element C1, referenced 1150, will hold its state as per the last signal received from the phase detector, neglecting any further

signals sent by the phase detector. This function can be better described as a "filter and hold function". The filter may be commanded into hold mode only when the phase lock loop has completely stabilized and the output of the phase detector 1110 is no longer changing. Alternatively the command can be linked to the modulation and transmission of the VCO signal, for example as required under various communication protocols or as determine by the microprocessor.

One or more of, or combinations of any versions of the "three modulation methods" (described in Figures 9 - 12) can be used to construct an RFID reader of Figure 1 or 2, an RFID tag of Figure 3 or 4, or an NFC device of Figure 5 or 6. Where the "three modulation methods" are the methods to generate and/ or modulate RF signals; 'carrier generation' of Figure 9, 'load modulation' of Figure 10 and 'carrier interference' of Figures 11 and 12. One example of such a variation would be the use of the sine synthesis method described for Figure 9 being used within the method described for Figure 11 (the interference modulation method). Persons skilled in the art will know that the methods described in Figures 9 - 12 are examples and that there are many other methods and combinations that can be used to provide functionality of RFID readers, RFID tags and NFC devices.

Figure 13 shows diagrammatically the situation where an anticollision protocol is necessary. Multiple separate tag-functionalities 1300 are all within range of a reader-functionality 1301. Each separate tag-functionality 1300 may for example include any combination as described herein with respect to Figures 1 to 12 and

consists of apparatus that includes the functionality of an RFID tag, an NFC device in tag-mode, or an NFC device in active-target mode. The reader-functionality 1301 may for example include any combination as described herein in relation to Figures 1 to 12 and consists of apparatus that includes the functionality of an RFID reader or NFC device in reader-mode. As each of the tag-functionalities sends its data to the reader-functionality the relevant anti-collision protocol implemented by the reader and tag functionalities will be followed, such that where tag-functionalities respond at the same time with different data, the protocol allows the reader-functionality to separately identify, and separately communicate with, each tag-functionality. Various known anticollision protocols which could be utilised in embodiments of the present invention will now be described.

Anticollision protocols generally consist of one or both of: collision avoidance and collision detection methods. If collision avoidance is used but fails to avoid a data collision then a collision detection method must subsequently be used. When a data collision is detected, the anticollision protocol will then utilize information correctly received, up until the collision occurred, to individually and selectively address particular tag functionalities. This process allows complete identification of all tag functionalities within range of the reader functionality.

Data collisions usually occur because two or more tag functionalities contain different identification data and/ or are of different tag functionality types. It will be readily understood by persons skilled in the art that in other situations, data representing other information could cause data collisions.

Figure 14 shows a first example modulation signalling method where data collisions occur and are detected. An example data bit sequence of five bit periods is shown; 1405 to 1409. A first tag functionality, A in this example, outputs data sequence 1400 shown as 01010 and represented by modulation signal 1401. A second tag functionality, B in this example, outputs data sequence 1402 shown as 00110 and represented by modulation signal 1403. Modulation for a data bit 0 occurs in the second half of a bit period, and modulation for a data bit 1 occurs in the first half of a bit period. Where tag functionality A and tag functionality B simultaneously transmit modulation signals 1401 and 1403, the reader functionality will demodulate a signal 1404. The reader functionality will recognise at bit periods 1406 and 1407 that modulation has occurred over the whole of each bit period, and this recognition shows that a data collision has occurred. Such data collisions may occur at any one or more data bits. This example shows data collisions from two tag functionalities, however the same method can be used for three or more tag functionalities.

Figure 15 shows a second example modulation signalling method where data collisions occur and are detected. An example data bit sequence of five bit periods is shown; 1505 to 1509. Tag functionality A in this example outputs data sequence 1500 shown as 01010 and represented by modulation signal 1501. Tag functionality B in this example outputs data sequence 1502 shown as 00110 and represented by modulation signal 1503. Modulation for a data bit 0 occurs as one phase of a signal, and modulation for a data bit 1 occurs as a signal 180 degrees out

of phase with respect to the signal representing a data bit 0. Where tag functionality A and tag functionality B simultaneously send modulation signals 1501 and 1503, the reader functionality will demodulate a signal similar to that shown at 1504. During bit periods 1506 and 1507 data collisions occur and due to the colliding signals being out of phase with each other, they tend to cancel each other out. The degree of this signal cancelling will depend upon factors such as for example the relative modulation methods used within tag functionality A and B and also the relative distance that they are away from the reader functionality. The reader functionality may use one or more methods to recognise such data collisions. One such method might be recognising a change in modulation level. A second such method might be that the low level of signal during a data bit collision causes a random decoding of the bit value to be 0 or 1, then if one or more bits have been decoded incorrectly, this can be recognised when a data checking algorithm is subsequently used, such as a cyclic redundancy check (CRC) algorithm. Persons skilled in the art will recognise that other known methods for recognising data collisions may be more or less advantageous. This example shows data collisions from two tag functionalities, however the same method can be used for three or more tag functionalities.

Figure 16 shows a third example modulation signalling method where data collisions occur and are detected. Modulation signals use the well-known Manchester coding method shown in this example at 1601 and 1603. A signal for a bit 0 is 180 degrees out of phase with the signal for a bit 1, and so the description

for the third modulation signalling method and the collision recognition methods can be taken to be the same as given for the second example in Figure 15.

Figure 17a shows a fourth example signalling method where data collisions occur and are detected. This method uses a pulse-position technique where the position of the modulation-pulse in a time period is determined according to the data represented by the pulse. In this example tag functionality A transmits data packet 01010 and the position of its modulation-pulse is shown at 1700. In this example tag functionality B transmits data packet 00110 and the position of its modulation-pulse is shown at 1701. Where tag functionality A and tag functionality B simultaneously send modulation signals 1700 and 1701, the reader functionality will demodulate a signal 1702. The reader functionality will recognise that two modulation pulses have occurred during the data packet period, and this recognition shows that a data collision has occurred. This example shows data collisions from two tag functionalities, however the same method can be used for three or more tag functionalities.

Figure 17b shows a fifth example signalling method where data collisions occur and are detected. This method uses a gap-position technique where the position of the carrier-gap in a bit period is determined according to whether the data bit is a 1 or a 0, and may in addition depend upon the value of previous bits. In this example tag functionality A transmits a data bit 0 by stopping the sending of a RF carrier signal for a short period at the beginning of the bit period, once the gap-time is complete, the carrier signal is switched back on for the rest of the bit

period, and this is shown at 1710. In a similar manner, tag functionality B transmits a data bit 1 by stopping its carrier for a short gap time at the beginning of the second half of the bit period and this is shown at 1711. Where tag functionality A and tag functionality B simultaneously send modulation carrier signals 1710 and 1711, the reader functionality will receive signal 1712. The reader functionality will recognise that a carrier signal has occurred over the whole bit period, and this recognition shows that a data collision has occurred. Such data collisions may occur at any one or more data bits. This example shows data collisions from two tag functionalities, however the same method can be used for three or more tag functionalities.

Figure 18 shows a first example of a collision avoidance method. A reader functionality determines to use a number of time slots, where in the duration of each time slot a complete reader-tag communication can occur. In the example of Figure 18, three such time slots are shown. According to the protocol being used, when a reader functionality sends a first command, then each tag functionality within range will determine which time slot to respond in. This time slot determination may be done by, for example, each tag functionality generating a random number or by using part of its unique identification number. There is a high probability that for each time slot only one tag functionality will respond, and in this case collision avoidance will have been successful. Where collision avoidance is successful the reader device knows the identity of all tag functionalities within range and can communicate individually with each one as it chooses, for example to read or write additional data. However, if two or more tag

functionalities respond in the same time slot, then the collision will be detected using, for example, one of the methods described with reference to Figures 14 to 17. Such a collision is shown as an example in Figure 18 as tag functionalities 1801 and 1802 both responding in the same time slot 1805.

Figure 19 shows a second example collision avoidance method. In this method, each tag functionality when responding to a reader functionality, generates its own RF field. In this example, time 1900 indicates when a reader functionality has finished sending a first command. A time delay 1905 later is the first time 1901 that a tag functionality may turn-on its RF field. The protocol is such that each tag functionality checks to ensure that another RF field is not present before it switches on its own field, however if it does detect another field, then it does not respond at all to this particular command. The protocol is also such that each tag functionality randomly selects a time that it would like to respond, shown as 1901 to 1904, and this provides a good chance that several tag functionalities will not attempt to respond at the same time. However if two or more tag functionalities do respond at the same time 1903 in this example, then at a pre-determined time delay 1906 later, as determined by the protocol they will both start to send their information during the period 1907. During the time period 1907 one or more data collisions will occur. Such collisions will be detected using, for example, one of the methods described in Figures 14 to 17.

Figure 20 shows an embodiment of an apparatus according to an aspect of the present invention.

An apparatus according to an aspect of the present invention may be constructed using any one or more, individually or in combination, of the methods or functionalities described in Figures 1 to 12, and may utilise one or more of the anticollision protocol functionalities described in Figures 14 to 19. However, persons skilled in the art will recognise that methods, protocols, and apparatus described in Figures 1 to 19 are described by way of example and that other examples are possible that fulfil the desired functionality.

In Figure 20, RFID/NFC functionality 2000 may be formed from one or more in any combination of the elements within functionalities 100 in Figures 1 and 2, 300 in Figures 3 and 4, or 500 in Figures 5 and 6. The larger device or system 2050 may or may not form part of the apparatus, but if present may take any form as described as 200 in Figure 2, 400 in Figure 4 or 600 in Figure 6.

The antenna 2002 of the RFID/NFC functionality 2000 is a single antenna for all RFID functionality and is capable of sending and/ or receiving RF signals represented as 2005. The antenna 2002 on its own fulfils the same functionality as one or more of antennas 102 in Figures 1 and 2, 306 in Figures 3 and 4 or 502 in Figures 5 and 6, 907 in Figure 9, 1006 in Figure 10, or 1122 in Figure 11

Power derivation means 2006 of the RFID/NFC functionality 2000 of Figure 20 may or may not be present, but if present may be formed from any one or more

functionality as described as 302 in Figures 3 and 4, 506 in Figures 5 and 6, 1002 in Figure 10, 1120 in Figure 11.

Data storage means 2007 of the RFID/NFC functionality 2000 may or may not be present, but if present may be formed from any one or more functionality as described as 305 in Figures 3 and 4, 507 in Figures 5 and 6, 1005 in Figure 10, or 1134 in Figure 11.

Demodulation means 2003 of the RFID/NFC functionality 2000 may or may not be present, but if present may be formed from any one or more functionality as described as 103 in Figure 1, 301 in Figure 3, 503 in Figure 5, 950 in Figure 9, 1001 in Figure 10, or 1148 in Figure 11.

The device interface 2051 of the larger system/device 2050, if present, interacts with functionality 2000 via control means 2004. The device interface 2051 has connections, not shown, to other functionalities within larger device or system 2050, and these other functionalities may incorporate some or all of data storage means 2007 and control means 2004. A power deriving means 2006 may, if present, supply power to some or all of larger device 2050.

The control means 2004 may be formed from one or more in any combination of, or any part of, elements 104 in Figures 1 and 2, 304 in Figures 3 and 4 or 504 in Figures 5 and 6, 916 in Figure 9, 1004 in Figure 10, or 1132 in Figure 11.

RF signal and modulation means 2001 may be formed from one or more in any combination of, or any part of, elements 101 in Figures 1 and 2, 303 in Figures 3 and 4 or 501 in Figures 5 and 6, 958 in Figure 9, 1003 in Figure 10, or 1102, 1104, 1106, 1130 and 1149 in Figure 11.

Two or more tag functionalities are emulated by control means 2004 and RF signal and modulation means 2001 in such a way that anticollision protocols relating to each tag functionality are conformed to. When such emulations are carried out by apparatus incorporating an aspect of the invention, the reader functionality initiating the communications continues the anticollision protocol in use at the time in a completely normal manner. Embodiments of the present invention thereby automatically facilitate multiple co-located tag functionalities to be read without the need for user intervention.

Embodiments of the present invention when carrying-out the emulation of multiple co-located tag functionalities may advantageously attempt to avoid collisions if the present anticollision protocol allows, or if collision avoidance is not part of the present protocol or if collision avoidance fails, then one or more data collision will be emulated. Emulated collision avoidance methods and data collisions may take a variety of forms according to the anticollision protocol being used at the time, and examples will now be described.

Apparatus of the present invention when emulating two or more tag functionalities that use a time-slot method as part of the relevant anticollision protocol as

described in relation to Figure 18, may advantageously determine that each of the emulated tags respond in a different time-slot. This is shown in Figure 23 where tag functionalities 2300, 2301 and 2302 being emulated within an apparatus of an embodiment of the invention are shown responding in different time-slots 2303, 2304 and 2305 respectively. This will advantageously allow the initiating reader functionality to identify and communicate with all the emulated tags within the apparatus of the invention in the shortest time.

Apparatus of the present invention when emulating two or more tag functionalities that use a response-time-jitter method as part of the relevant anticollision protocol, as described in relation to Figure 19, may advantageously determine that each of the emulated tags respond in a different jitter-time. This is shown in Figure 24 where tag functionalities being emulated within an apparatus configured in accordance within an embodiment of the invention could each respond in different times 1901 to 1904. This will advantageously allow the initiating reader functionality to identify and communicate with all the emulated tags within the apparatus by for example selectively halting each tag as it is identified so as to discover all the other emulated tags responding at different times. Alternatively or as well, an apparatus of an embodiment of the invention may advantageously configure all emulated tags to respond at the same time 2401 for example in Figure 24, so forcing data collisions after time 2406 during the data transfer at 2407 and so allowing the reader functionality to identify all emulated tag functionalities.

If any collision avoidance methods fail to avoid collisions or the algorithm in use at the time does not use collision avoidance, then embodiments of the invention will emulate data collisions.

Where embodiments of the invention emulate data collisions within a protocol that uses data coding as described for Figure 14, it will be advantageous for the apparatus to send a modulation signal 2101 in Figure 21a for each data collision represented in bit-period 2103. Such data collisions occur when an apparatus according to an embodiment of the invention is required to send a signal that represents simultaneously sending both a digital 1 and a digital 0, shown in Figure 21a as 2100 at bit period 2103.

Where apparatus according to another embodiment of the invention emulates data collisions within a protocol that uses data coding as described for Figure 15 or Figure 16, it will be advantageous for the apparatus to send a modulation signal 2106 or 2107 in Figure 21b for each data collision represented in bit-period 2109. Such data collisions occur when an apparatus according to an embodiment of the invention is required to send a signal that represents simultaneously sending both a digital 1 and a digital 0, shown in Figure 21b as 2105 at bit period 2109.

It may be advantageous for embodiments of the invention to use an alternative method of signalling collided data for emulated tags using protocols described in Figures 15 or 16. In this case for example, instead of emulating simultaneous sending of both digital bit 1 and 0 as shown as signal 2105 in bit period 2109 in

Figure 21b, it may be advantageous to send all signals representing data bits as either a binary 1 or 0 shown as signals 2106 and 2107 at bit periods 2108 and 2110. In such a case, apparatus of the invention may then send the incorrect values for one of more data bits so that the reader functionality discovers the bit error during the time that the reader functionality checks the integrity of the transmitted data, during the cyclic redundancy check (CRC) for example. Such incorrect data bits may advantageously be sent during the actual data transmission of a data packet 2111 for example, in Figure 21b, and such incorrect data may be sent during the initial data byte 2112, any other of the data bytes up to and including the last one 2113, or during CRC bytes shown in this example as 2114 and 2115.

In embodiments of the invention which emulate data collisions within a protocol that uses data coding as described for Figure 17a it will be advantageous for the apparatus to send a modulation signal 2200 in Figure 22 for example that emulates in this example, two tag functionalities responding in the same time period with different data.

In embodiments of the invention which emulate data collisions within a protocol that uses interruption of sending of active carrier signals as described in Figure 17b, it will be advantageous for the apparatus to send a continuous carrier signal 2201 in Figure 22 during the bit period where the apparatus is required to send a signal that represents simultaneously sending both a digital 1 and a digital 0.

The collision detection and avoidance methods described in Figures 14 to 19 and 21 to 24 are shown as examples only and persons skilled in the art will understand that any one or more collision detection method may be used in conjunction with any one or more collision avoidance method. Persons skilled in the art will readily appreciate that many other collision detection and/ or collision avoidance methods may advantageously be used. Persons skilled in the art will therefore recognise that apparatus of the invention might advantageously emulate any such additional collision avoidance or collision detection methods.

Figure 25 shows a flow diagram of an example embodiment of operation of an apparatus of the invention incorporating multiple tag emulator functionality when such apparatus is within range of a reader functionality. Function steps of an example apparatus of the invention are shown on the left-hand side of Figures 25a, 25b, and 25c and each step is outlined with a solid line. Functional steps of a reader functionality, within communications range of the example apparatus of the invention, are shown on the right-hand side of Figures 25 and each of these steps is outlined with a dotted line.

At step S1 the reader functionality transmits an RF signal. An apparatus configured in accordance with the invention within range of the reader receives the RF signal, shown at S2. If such apparatus contains power-deriving means and the apparatus is configured to make use of such power deriving means, then power for some or all of the apparatus is derived from the incoming RF signal, step S3.

The reader functionality then sends a command communication by modulating its RF signal, and when the initial communications according to the protocol being used, have been sent, then the reader functionality continues to send an RF signal but with no modulation, step S4.

At step S5 the apparatus comprising multiple tag emulator functionality according to an embodiment of the invention demodulates the modulated signal sent from the reader functionality. The apparatus interprets the communication so that it can identify the protocol being used by the reader, step S6. When the current protocol is identified by the apparatus, it checks to see if any of its internally emulated tags can respond to the same protocol, step S7. If none of the emulated tags conform to the current protocol then the apparatus does not respond to the reader, step S9. However if one or more of the emulated tags do conform to the protocol, then the apparatus checks to see if more than one of its emulated tags conform to the same protocol, step S10. If only one emulated tag conforms to the protocol then the apparatus responds to the reader according to the protocol, step S11. The reader demodulates data sent by the apparatus and then continues its communications sequence according to the protocol, so that it identifies the emulated tag within the apparatus, step S12. If at step S10 the apparatus finds that it contains two or more emulations of tags that conform to the protocol, then the apparatus may, if the protocol allows, attempt to avoid data collisions by using the protocol's collision avoidance procedure, step S14. Such collision avoidance methods may for example include one or more of those described in Figures 23 and 24.

At step S15 the apparatus determines whether a data collision between its emulated tags can be avoided. If a collision can be avoided, then the apparatus responds to the reader according to the identified protocol such that the reader can continue its communication sequence to identify each of the emulated tags within the apparatus.

If at step S15 the apparatus determines that it cannot avoid a data collision between its emulated tags, then the apparatus emulates data collisions according to the current protocol at step S18. Then at step S19 the apparatus responds to the reader according to the protocol, but wherever the apparatus sends data collisions it does so according to example methods described in Figures 21a, 21b and 22. The reader demodulates data sent by the apparatus and then continues its communications sequence according to the protocol, such that it identifies when data collisions have occurred so that it identifies all emulated tags within the apparatus, step S20.

At steps S11, S16 and S19 when the apparatus responds to communications from the reader functionality, the apparatus will use one or more or any part of modulation techniques as described in Figures 9 to 12.

At steps S4, S12 and S20 the reader functionality continues the communication sequence with the apparatus by modulating its RF signal, then ceasing its modulation, then demodulating modulated signals sent by the apparatus. However, if one or more other separate tag functionalities (not shown) also respond, then the

reader functionality will follow its anticollision protocol so that it can identify and communicate with all tag functionalities, including the apparatus of the invention.

At the end of step S4 where the reader functionality completes its transmission of modulated signal, if the protocol requires, the reader will switch off its RF signal. Then at step S11, S16 or S19 the apparatus will generate its own RF carrier signal that it then modulates according to the protocol being used at the time, using for example methods as described for Figure 9.

An example application and use of such application will now be described. The example application is where multiple tag emulator functionality is incorporated within a mobile phone and emulated tags include public transport tickets. An example journey will be described. A person who owns such a mobile phone starts a journey that requires a bus and then a train journey.

This person starts the journey by purchasing a bus ticket by placing the mobile phone in proximity to the ticket-issuing machine. This person selects a multi-journey ticket-type and the ticket is then wirelessly copied into the phone and payment is taken. Upon boarding the bus, this person holds the phone in proximity to the ticket reader, and then the reader wirelessly reads the ticket and one journey is deducted from the journey quantity-list held within the ticket within the phone.

When arriving at the railway station this person purchases a train ticket in the same manner as for the bus ticket. The phone stores this second ticket data in a separate

portion of internal memory that the bus ticket was stored within. The phone now holds two co-located tags. Next, the person walks up to the access gate on the platform and holds the phone in proximity to the RFID ticket reader. The reader interrogates the phone and discovers that there are two tickets within it. The tickets are both of a type conforming to the ISO/IEC 14443A standard, which means that when the phone emulates the two tickets, a data collision occurs during the reading of the unique identification number within each of the tickets. The ticket reader follows the anticollision protocol and identifies both tickets and reads some information from each one. When the reader discovers that one of the tickets is a bus ticket, it ceases communication with the bus ticket and resumes communication with the train ticket. Upon discovering that the train ticket is valid, the reader sends a signal to the gate to open, which allows our person to walk onto the platform and catch the train.

In another example application nurses in a hospital may carry around a portable NFC device which is used both to read patient charts and download data from such patient charts (i.e. download a tag) and to administer and/or provide data for the care of the patient. The NFC device will contain tags relevant to each patient and therefore hold a plurality of co-located tags. A separate reader in the vicinity of the patient may be responsible for controlling drug dosage to the patient. The reader will read data from a corresponding tag to ensure that the correct dosage is administered to the patient. The nurse may bring the NFC device into the proximity of the reader to update the reader information and enable the reader to download the correct information for a particular patient. The reader will

interrogate the NFC device and discover that there are multiple tag functionalities residing within it. The NFC device will have emulated a data collision event in accordance with the relevant protocol thus communicating the presence of multiple tags to the interrogating reader. The reader will then use its internal protocol to select the tag it is interested in and continue communication with that tag.

As a further example the multiple tags stored on an RFID device may be unrelated but all comply with the same protocol, for example ISO 14443A. For example one tag may comprise a train ticket, another tag may comprise a music download and a third tag may comprise a security card for admission to a library. In such a case the RFID device would then comprise three co-located tags. Depending on the reader into the vicinity of which the RFID appears, the RFID device will emulate a collision in accordance with ISO 14443A for all three tags it holds. The reader will use its own internal anti-collision protocols to select the tag it is interested in, stop communication with the other tags and continue or resume communication with the tag of relevance.

The above embodiments are to be understood as illustrative examples of the invention. Further embodiments of the invention are envisaged. For example, the proposed solution may also be used with other forms of antenna and other coupling mechanisms, such as far field electromagnetic, acoustic or optical. Other examples of phase coherent detection or phase sensitive detection systems would include but are not limited to injection locking receiving circuitry, parametric amplifying receiving circuitry and delay lock loop receiving circuitry.

It is to be understood that any feature described in relation to any one embodiment may be used alone, or in combination with other features described, and may also be used in combination with one or more features of any other of the embodiments, or any combination of any other of the embodiments. Furthermore, equivalents and modifications not described above may also be employed without departing from the scope of the invention, which is defined in the accompanying claims.

CLAIMS

1. An RFID system comprising means for emulating a plurality of RF data storage devices each having a different identifier, control means for controlling the transmission simultaneously or sequentially of two or more of the said identifiers in response to receipt of a signal from a reader, and means for transmitting simultaneously or sequentially two or more of the said identifiers.

2. A system as claimed in Claim 1 wherein the transmission of the identifiers emulates the sequential transmission of two or more different identifiers in accordance with a collision avoidance protocol.

3. A system as claimed in Claim 1 or Claim 2, wherein the transmission of the identifiers emulates the simultaneous or sequential transmission of two or more different identifiers in accordance with a collision detection protocol.

4. A system as claimed in any one of Claims 1 to 3 wherein each of the said identifiers comprises a different modulation sequence or pattern and the transmitted identifiers are generated by combining at least part of the said modulation sequence or patterns of the said data storage devices.

5. A system as claimed in Claim 4 wherein the said transmitted identifier is generated by combining at least part of the said modulation sequence or patterns of a selected group of sequences or patterns corresponding to a set of data storage devices.

6. A system as claimed in any of Claims 1 to 3 wherein the transmitted identifiers are generated by the summation of at least part of the modulation sequences or patterns of the identifiers of the data storage devices.

7. A system as claimed in any preceding claim wherein each data storage device being emulated comprises an RFID tag or a device incorporating RFID tag functionality.

8. A system as claimed in Claim 7 wherein the said RFID tags or RFID devices comprise RFID tickets.

9. A system as claimed in any preceding claim wherein the means for transmitting the identifiers comprises a single antenna.

10. A system as claimed in any preceding claim wherein the means for emulating a plurality of data storage devices is located or stored within non-volatile memory means.

11. A system as claimed in any preceding claim further comprising an RFID reader.

12. A system as claimed in Claim 11 wherein the said reader comprises a hand held device.

13. A device comprising a system according to any one of Claims 1 to 10.

14. A device as claimed in Claim 13 wherein the device is a mobile phone, personal digital assistant, or other hand held device.

15. A method of operating an RFID system comprising the steps of: emulating a plurality of RFID tags in a device, the tags each having a different identifier associated therewith; simultaneously or sequentially transmitting of said identifiers by the device.

16. A method as claimed in Claim 15 wherein the said transmission emulates the sequential transmission of two or more different identifiers in accordance with a collision avoidance protocol.

17. A method as claimed in Claim 15 or Claim 16 wherein the said transmission emulates the simultaneous or sequential transmission of two or more different identifiers in accordance with a collision detection protocol.

18. A method as claimed in any of Claims 15 to 17 further comprising the steps of receiving the said transmitted identifiers and detecting a plurality of RFID tags within the range of the reader.

19. A method as claimed in Claim 16 or Claim 17 further comprising the step of implementing a collision avoidance and/or a collision detection protocol to enable the emulated RFID tags to be read by the reader.

20. A method according to any of Claims 15 to 19 wherein the said method is automated and capable of implementation in a system according to any one of Claims 1 to 12 independently of user input.

FIG. 1

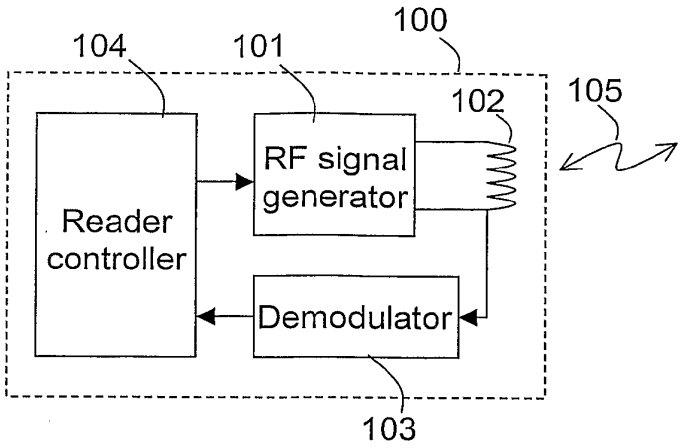

100
104
101
102
105
RF signal generator
Reader controller
Demodulator
103

FIG. 2

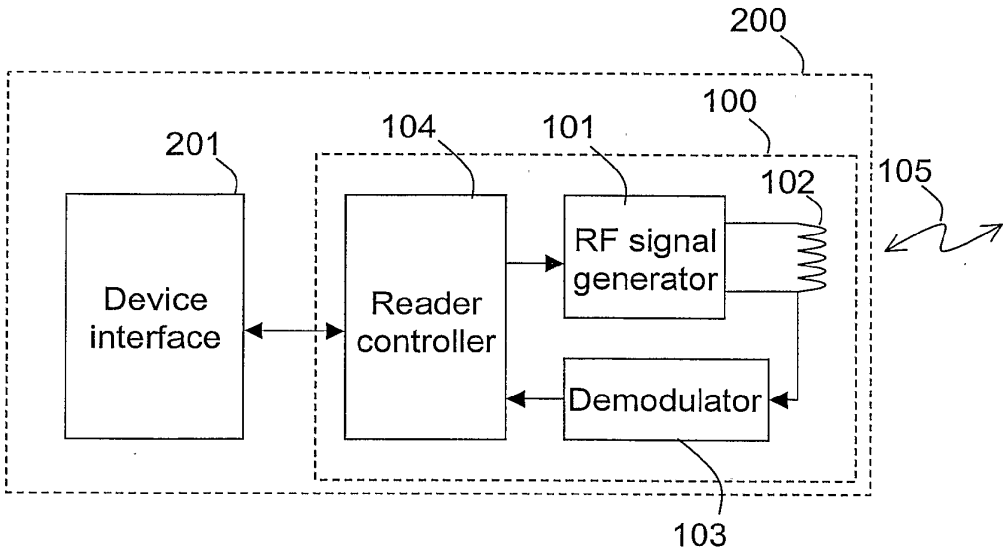

200
100
201
104
101
102
105
Device interface
Reader controller
RF signal generator
Demodulator
103

FIG. 3

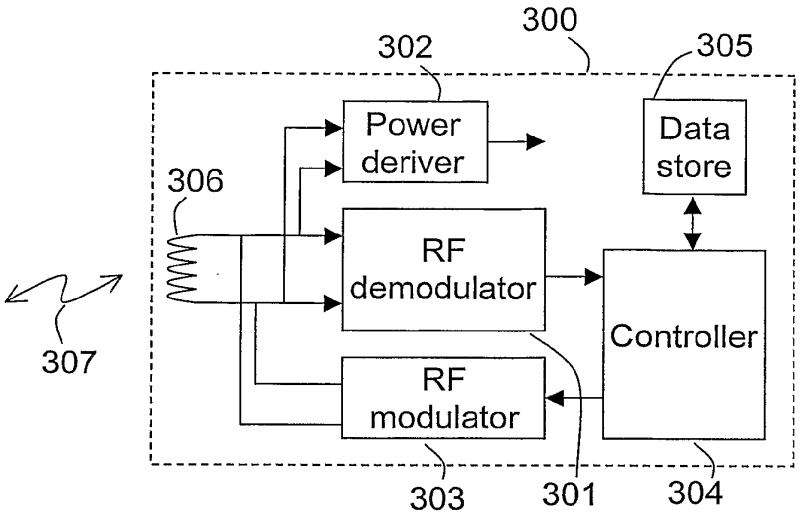

300
302
305
Power deriver
Data store
306
RF demodulator
Controller
307
RF modulator
303
301
304

FIG. 4

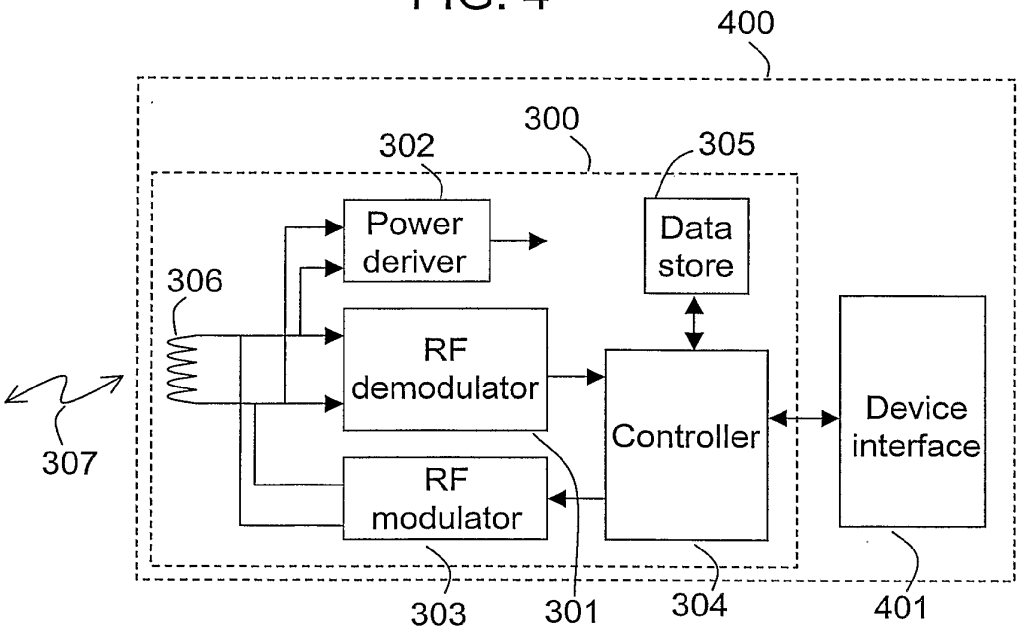

400
300
302
305
Power deriver
Data store
306
RF demodulator
Controller
Device interface
307
RF modulator
303
301
304
401

FIG. 5

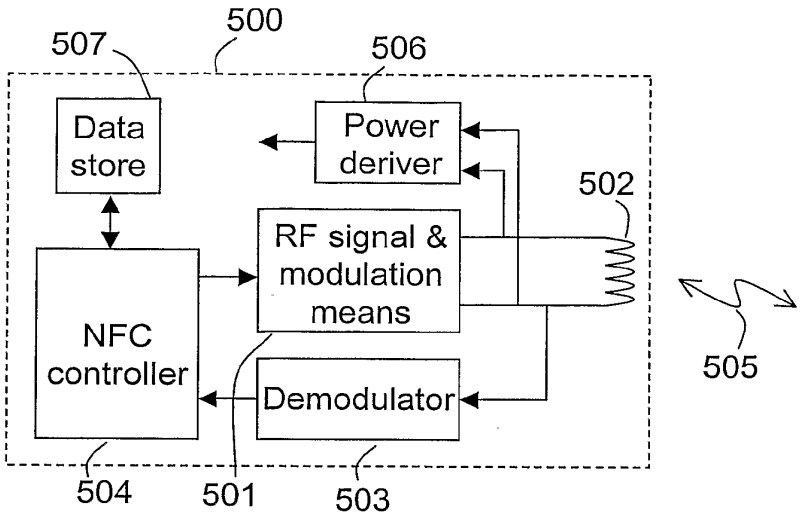

500
507
506
Data store
Power deriver
502
RF signal & modulation means
NFC controller
Demodulator
505
504
501
503

FIG. 6

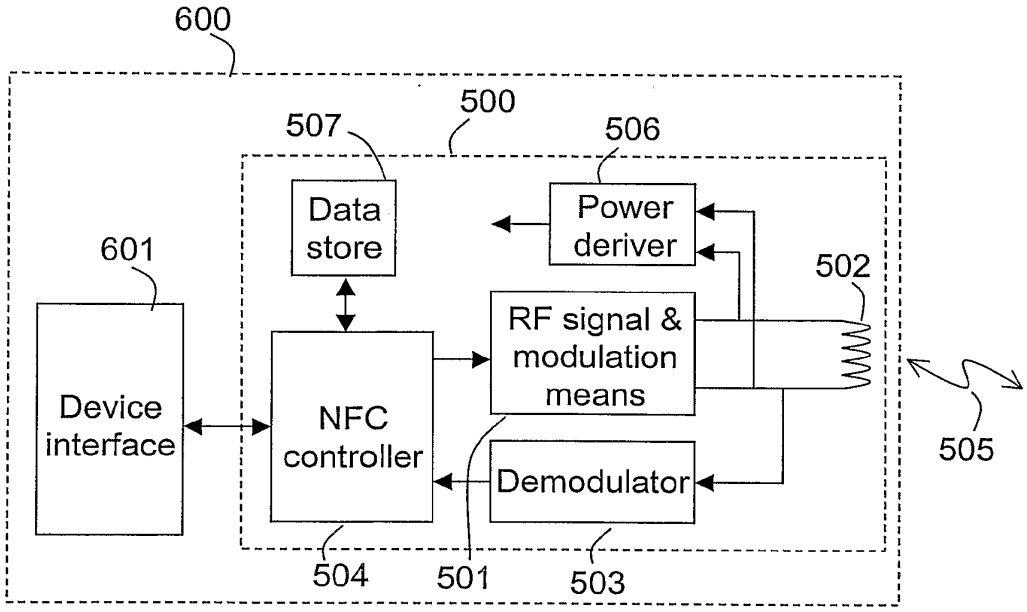

600
500
507
506
Data store
Power deriver
601
502
RF signal & modulation means
Device interface
NFC controller
Demodulator
505
504
501
503

FIG. 7

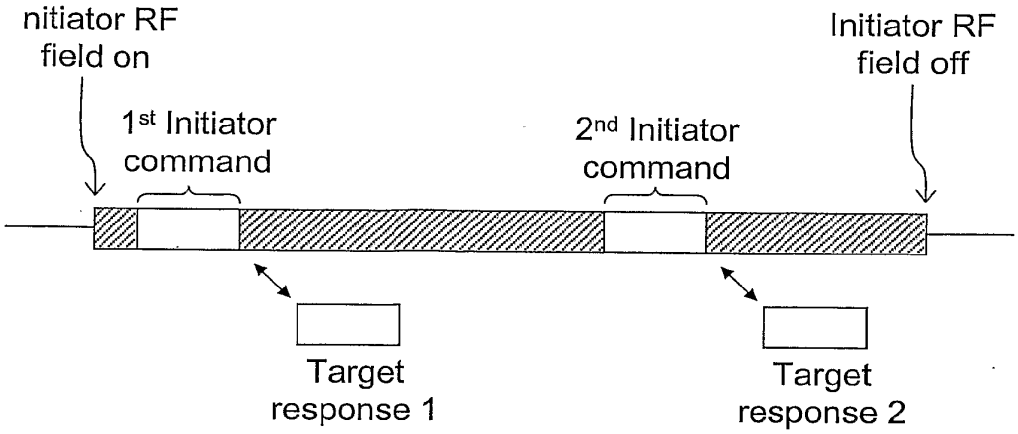

nitiator RF
field on
1st Initiator
command
2nd Initiator
command
Initiator RF
field off
Target
response 1
Target
response 2

FIG. 8

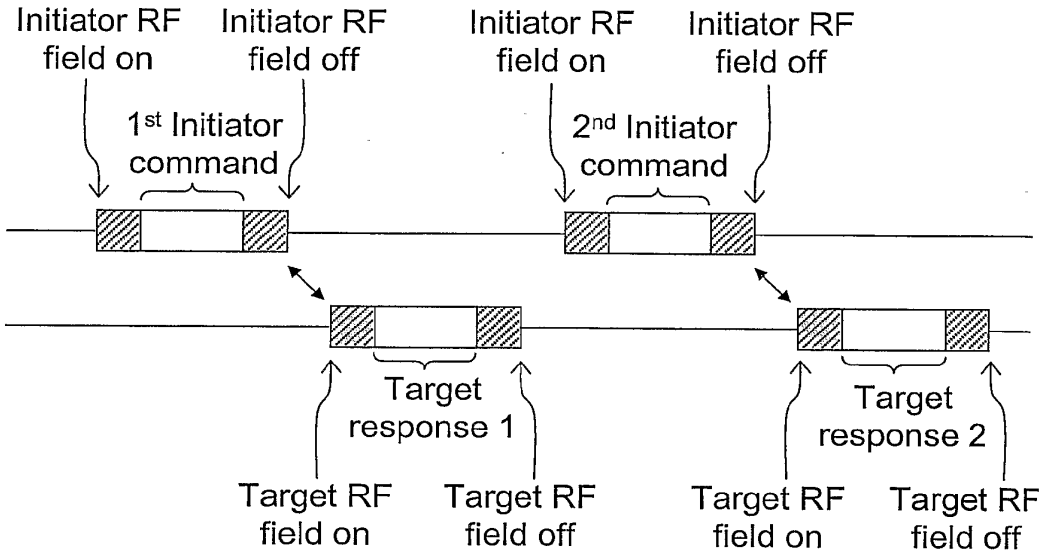

Initiator RF
field on
Initiator RF
field off
1st Initiator
command
Initiator RF
field on
Initiator RF
field off
2nd Initiator
command
Target
response 1
Target
response 2
Target RF
field on
Target RF
field off
Target RF
field on
Target RF
field off

FIG. 9

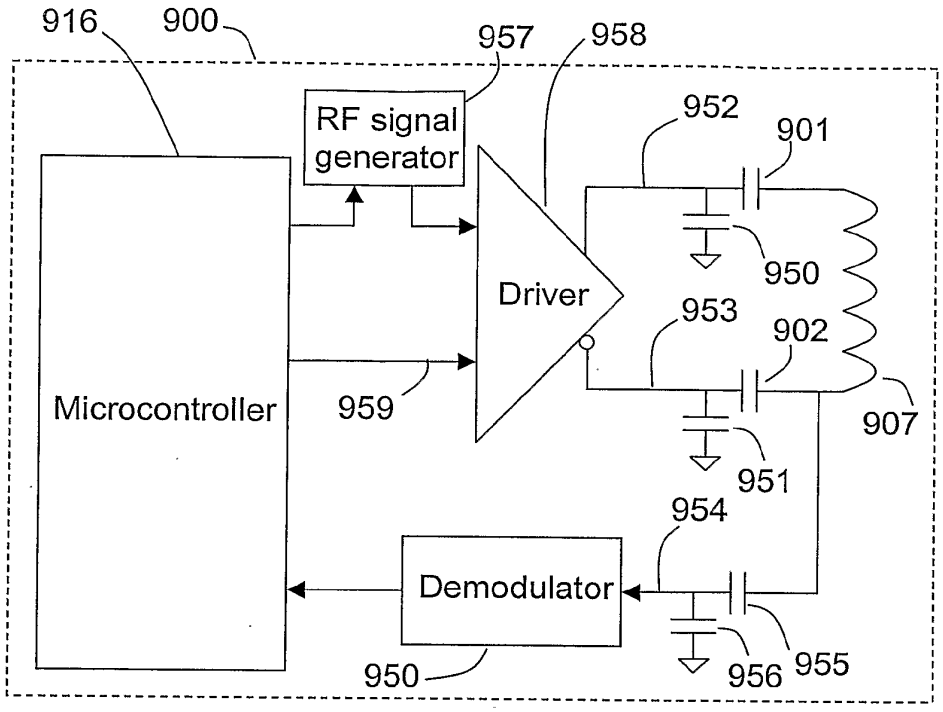

916
900
957
958
RF signal generator
952
901
950
Driver
953
902
907
Microcontroller
959
951
954
Demodulator
950
956
955

FIG. 10

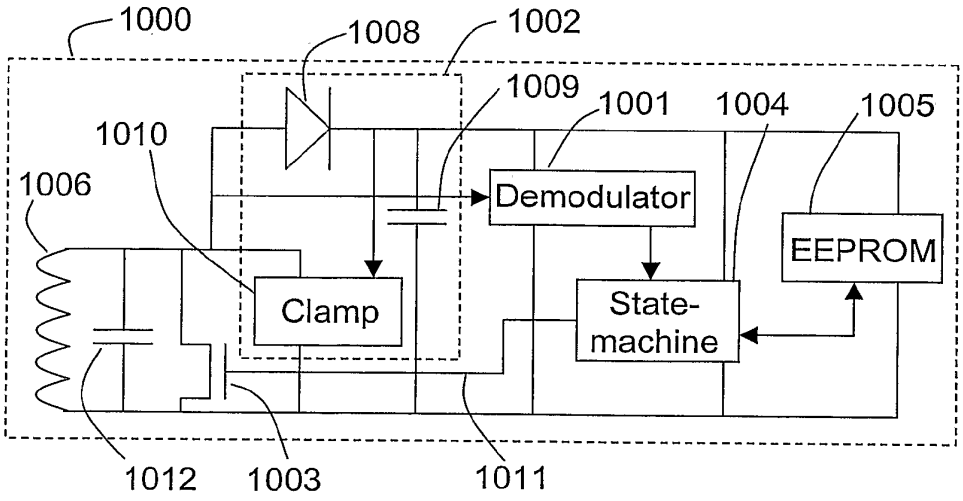

1000
1008
1002
1009
1001
1004
1005
1010
1006
Demodulator
EEPROM
Clamp
State-machine
1012
1003
1011

FIG.11

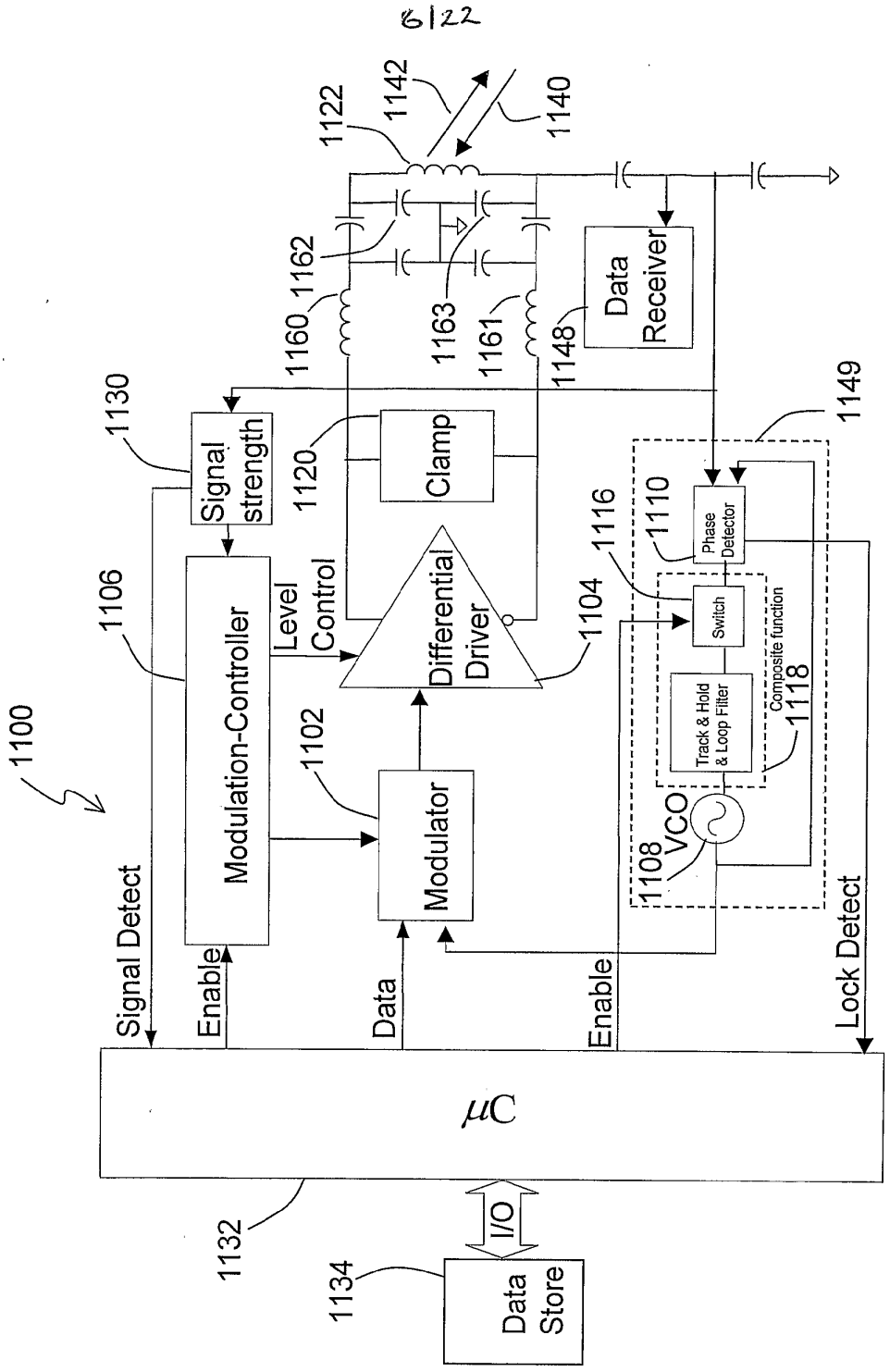

1100
1102
1104
1106
1108
1110
1116
1118
1120
1122
1130
1132
1134
1140
1142
1148
1149
1160
1161
1162
1163
Modulation-Controller
Modulator
Differential Driver
Level Control
Clamp
Signal strength
Phase Detector
Switch
Composite function
Track & Hold & Loop Filter
VCO
Data Receiver
Data Store
I/O
μC
Signal Detect
Enable
Data
Enable
Lock Detect

FIG. 12

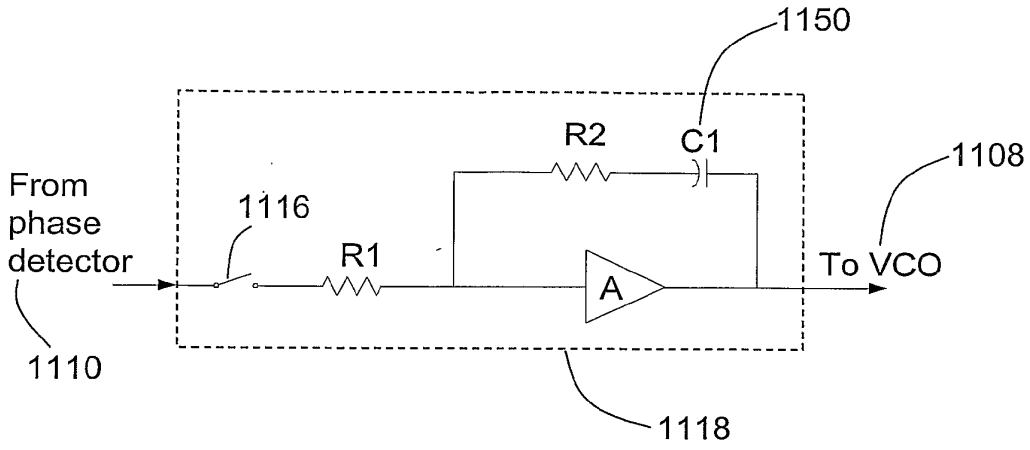


FIG. 13

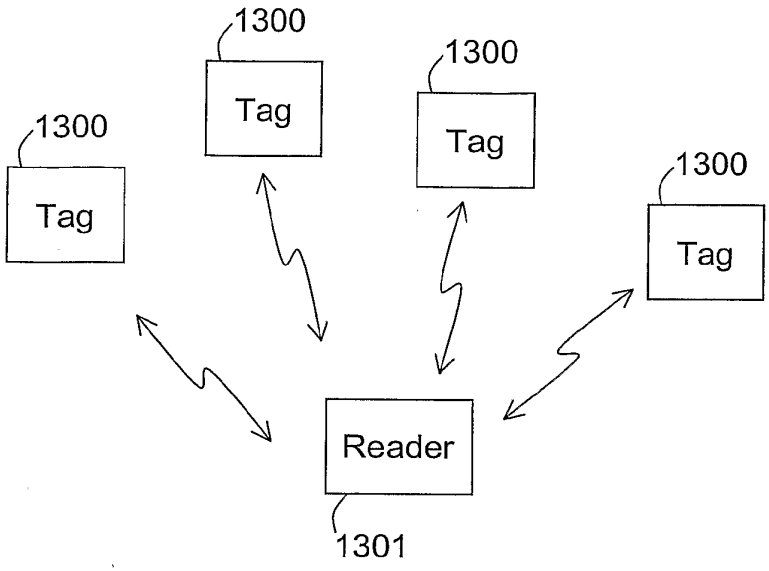


FIG. 14

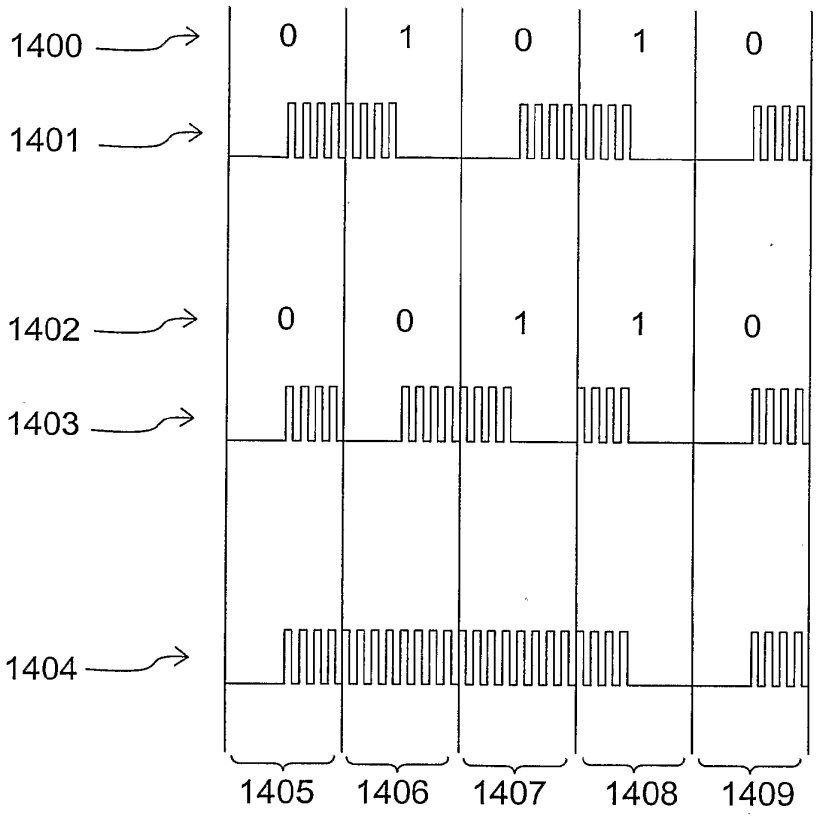

1400
1401
1402
1403
1404
0
1
0
1
0
0
0
1
1
0
1405
1406
1407
1408
1409

FIG. 15

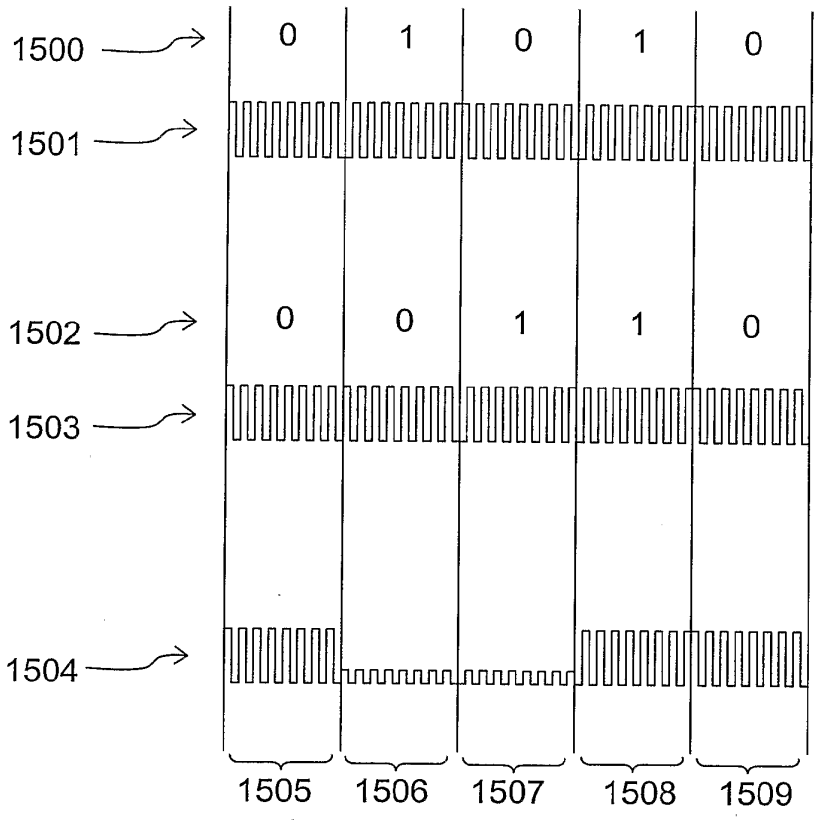

1500
1501
1502
1503
1504
0
1
0
1
0
0
0
1
1
0
1505
1506
1507
1508
1509

FIG. 16

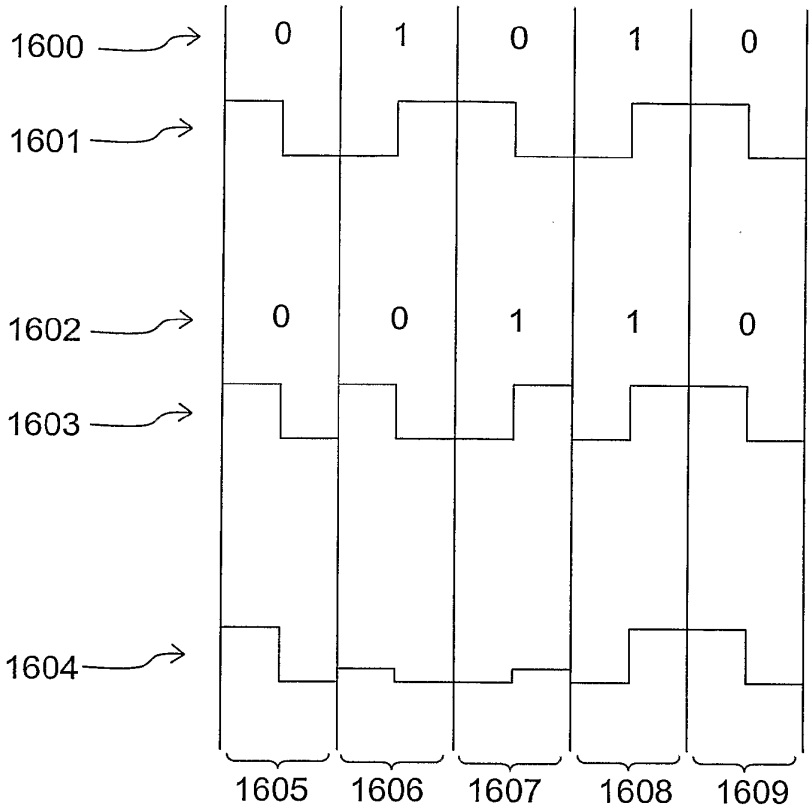

1600
1601
1602
1603
1604
0
1
0
1
0
0
0
1
1
0
1605
1606
1607
1608
1609

FIG. 17a

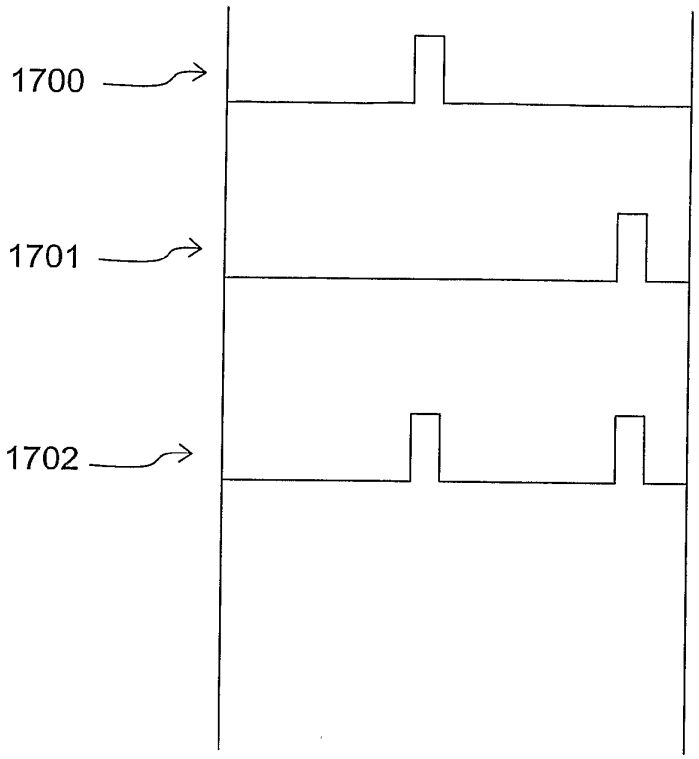


FIG. 17b

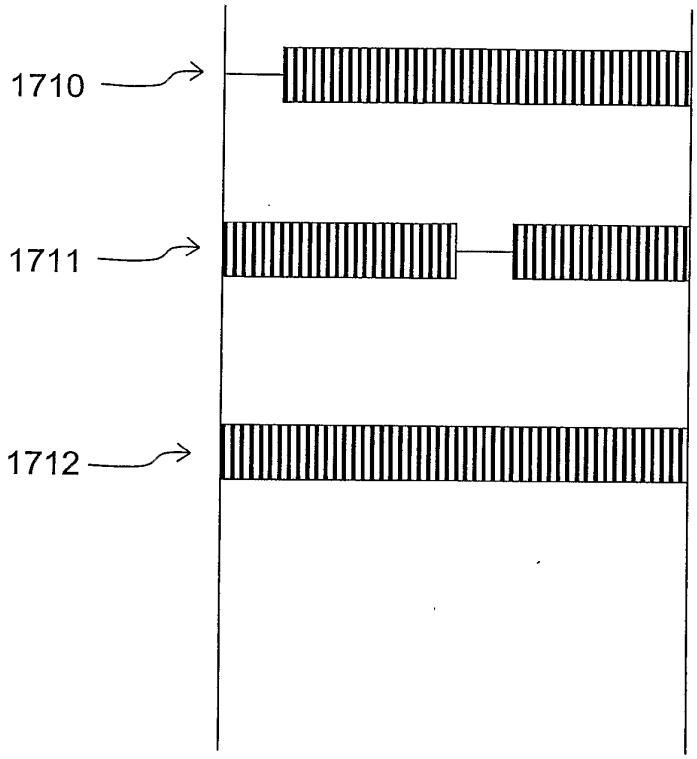


FIG. 18

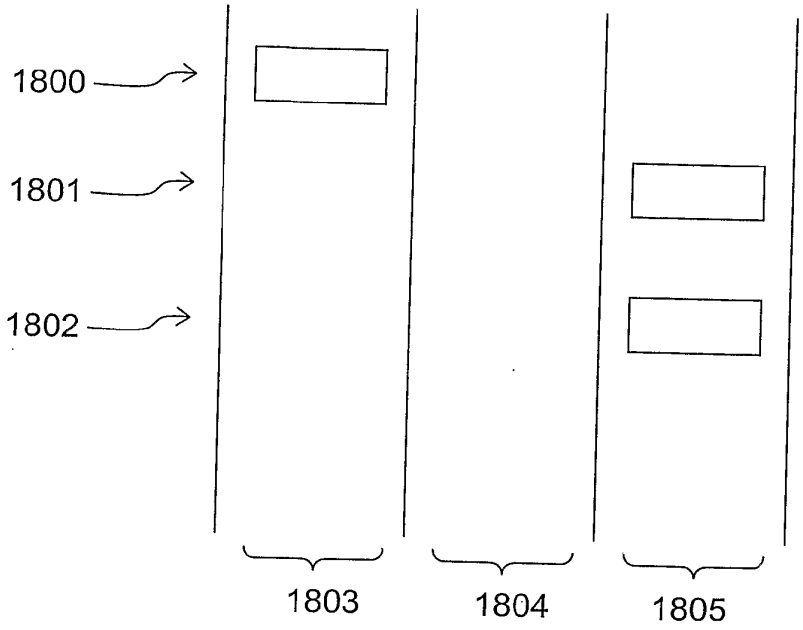


FIG. 19

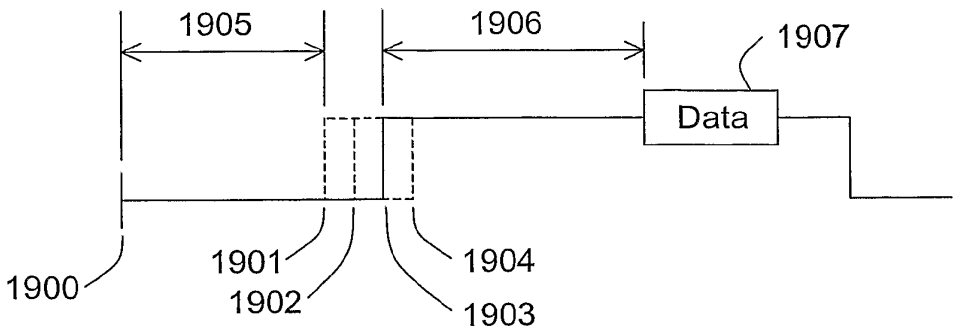


FIG. 20

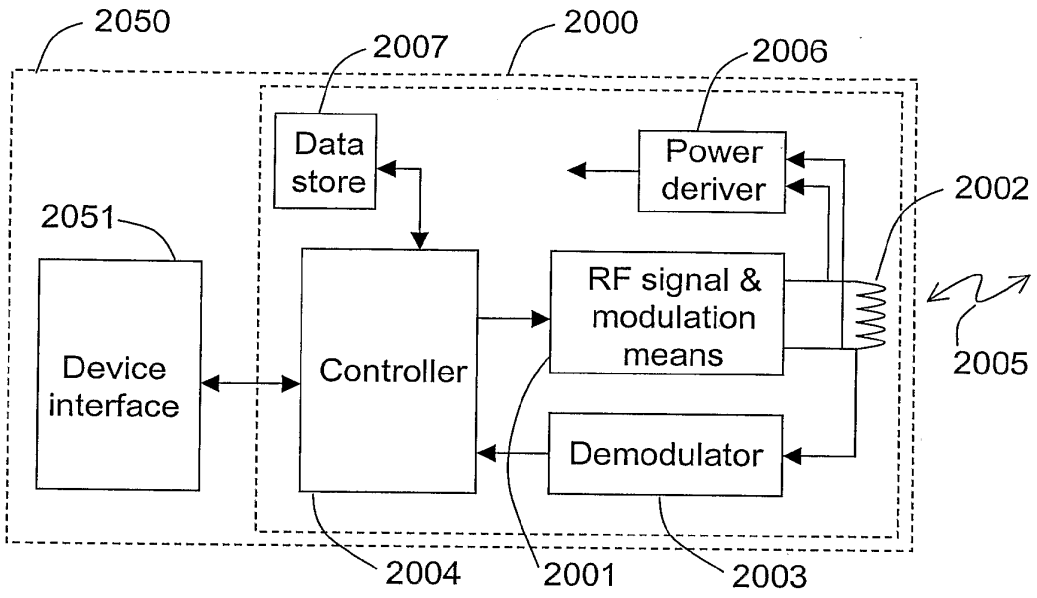

2050
2007
2000
2006
Data store
Power deriver
2002
2051
RF signal & modulation means
Device interface
Controller
2005
Demodulator
2004
2001
2003

FIG. 21a

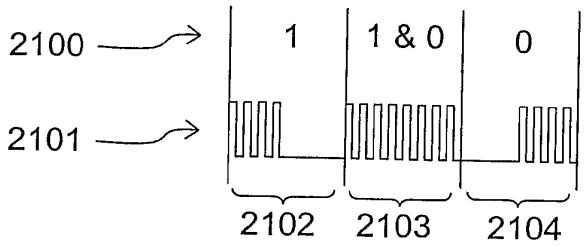
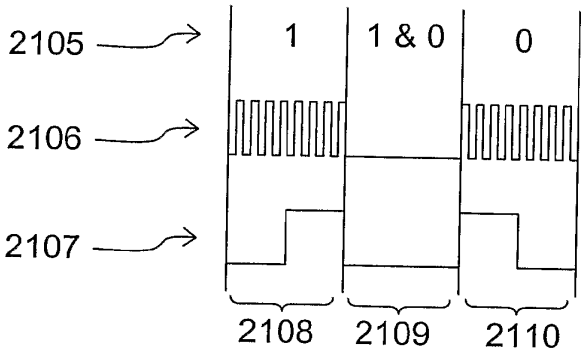


FIG. 21b



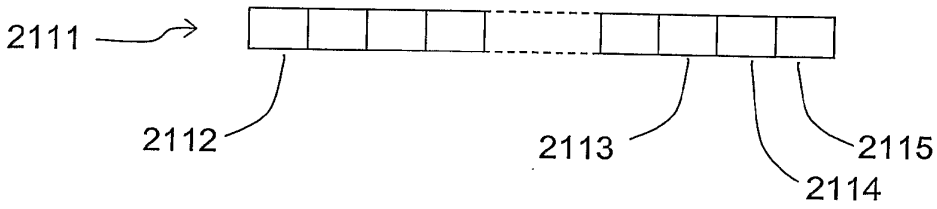


FIG. 22

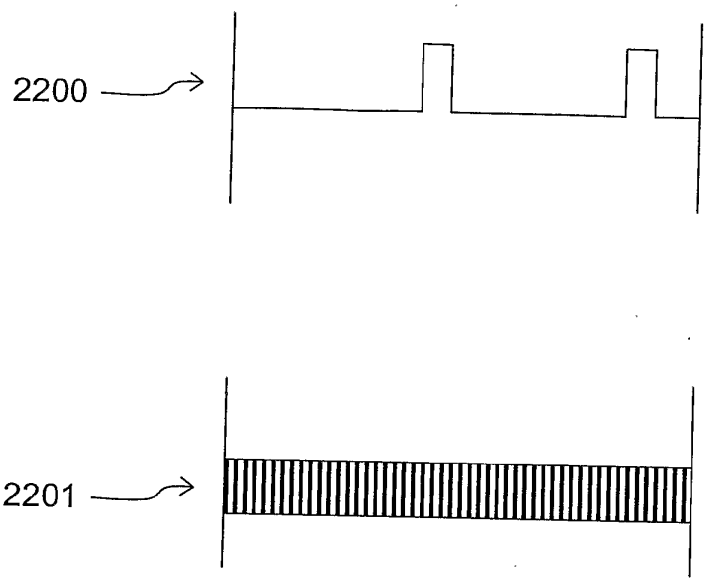


FIG. 23

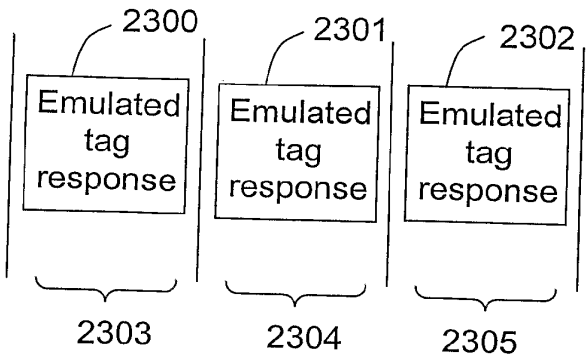
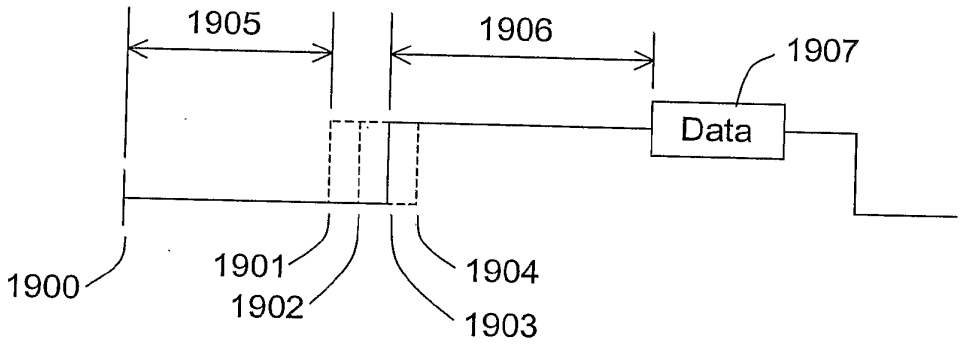

2300
2301
2302
Emulated tag response
Emulated tag response
Emulated tag response
2303
2304
2305

FIG. 24


1905
1906
1907
Data
1900
1901
1902
1903
1904

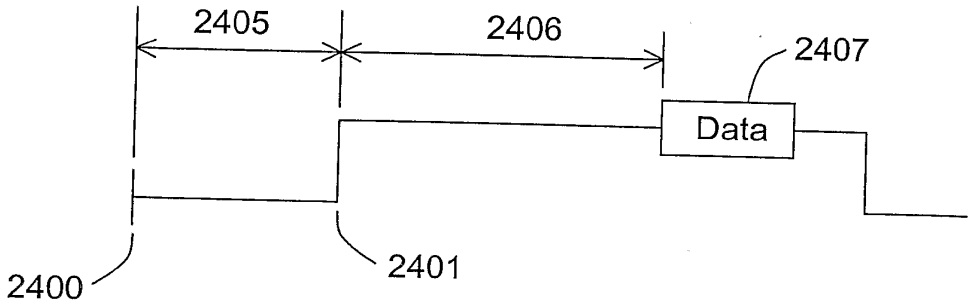

2405
2406
2407
Data
2400
2401

FIG. 25a

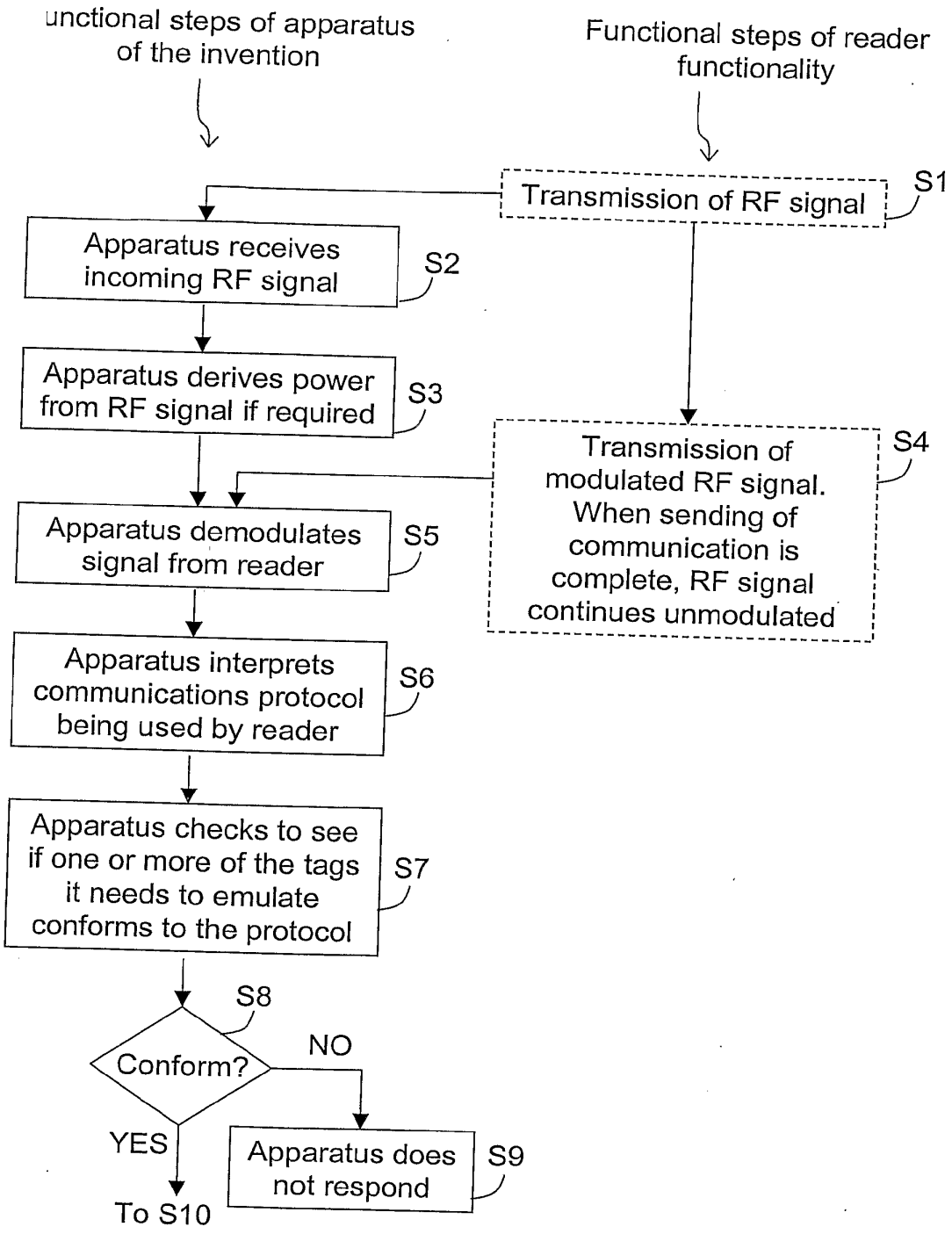

unctional steps of apparatus of the invention
Functional steps of reader functionality
Transmission of RF signal
S1
Apparatus receives incoming RF signal
S2
Apparatus derives power from RF signal if required
S3
Transmission of modulated RF signal. When sending of communication is complete, RF signal continues unmodulated
S4
Apparatus demodulates signal from reader
S5
Apparatus interprets communications protocol being used by reader
S6
Apparatus checks to see if one or more of the tags it needs to emulate conforms to the protocol
S7
S8
Conform?
NO
YES
Apparatus does not respond
S9
To S10

FIG. 25 continued

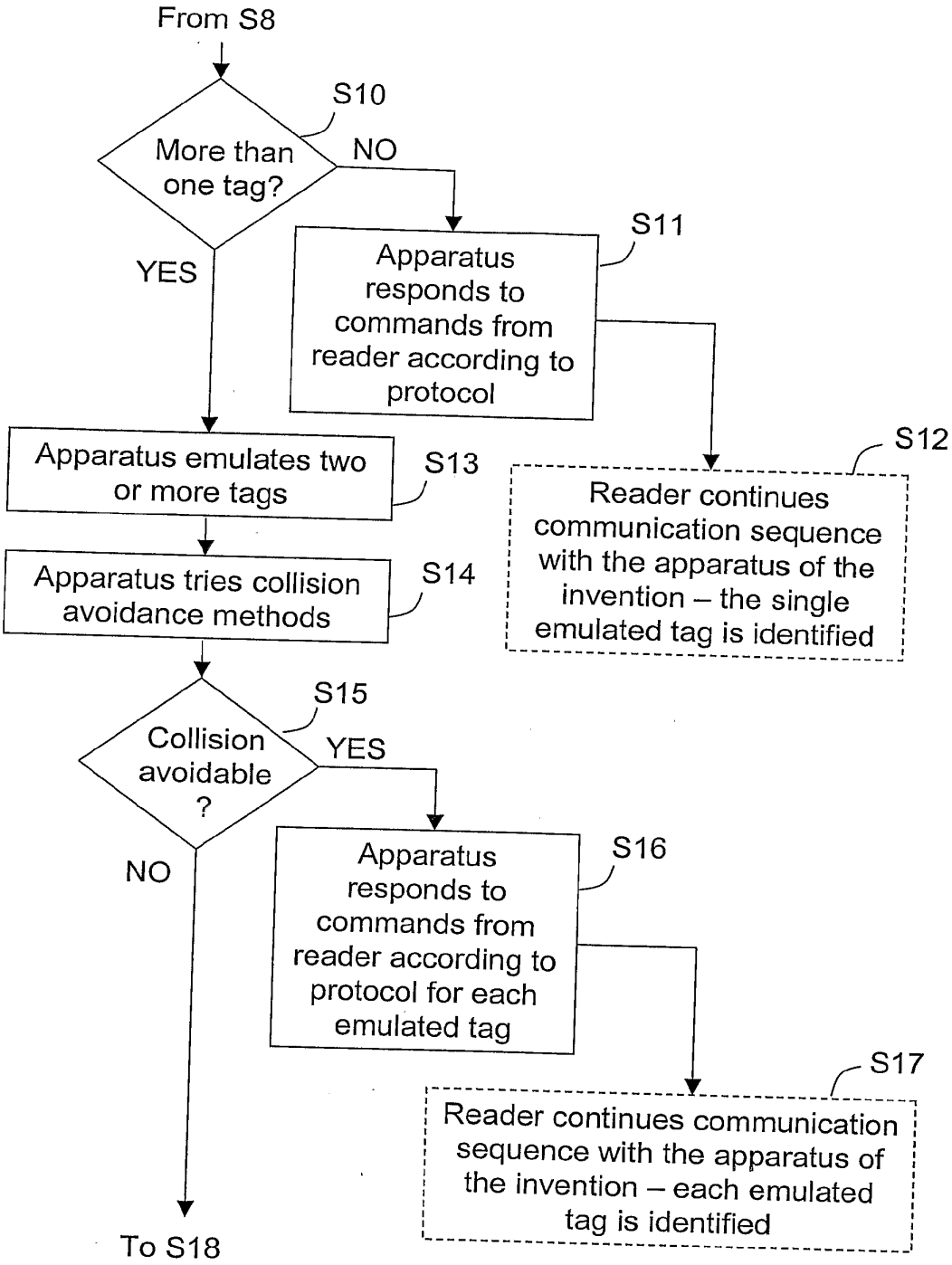
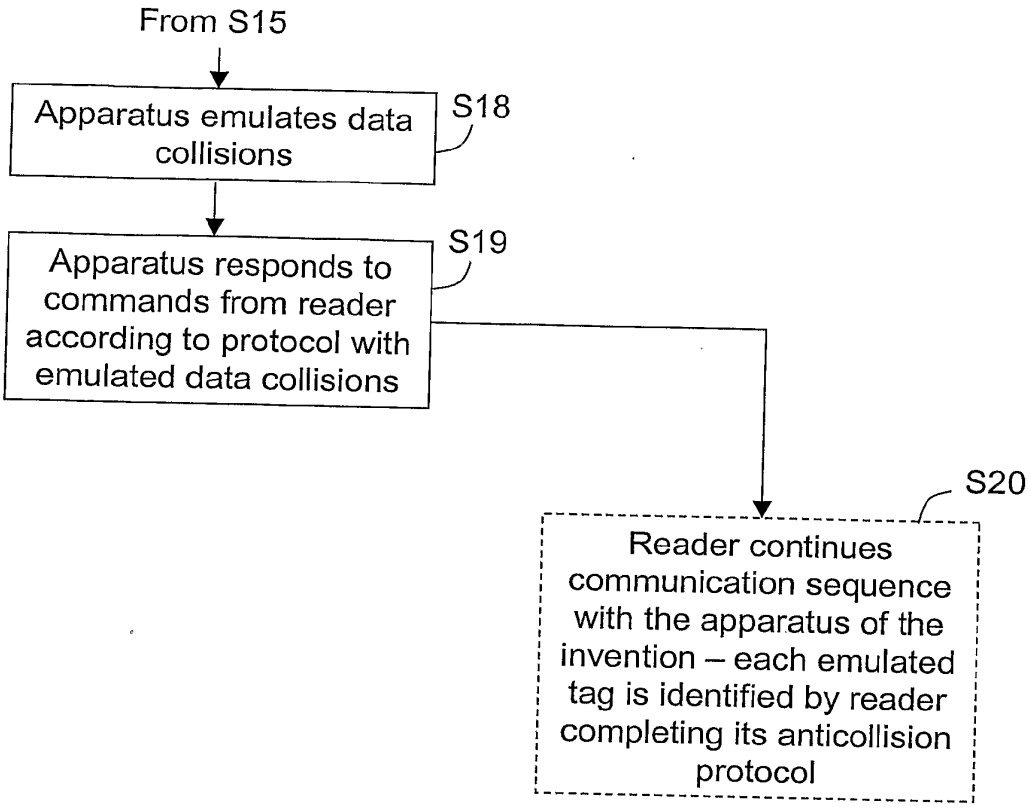


FIG. 25 continued



INTERNATIONAL SEARCH REPORT

Inte Application No
PC I/GB2005/002990

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06K19/07

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06K G07C G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 111 557 A (FUJITSU LIMITED) 27 June 2001 (2001-06-27) column 1, line 29 - line 32; figure 6	1-20
P,A	WO 2004/114239 A (WILDSEED LTD; ZATLOUKAL, PETER; ENGSTROM, ERIC, G; SMITH, CINDY, M) 29 December 2004 (2004-12-29) page 12, line 23 - page 13, line 4	1,15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 October 2005	07/11/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Chiarizia, S

3

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interr Application No
PCT/GB2005/002990

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1111557 A	27-06-2001	JP 2001167241 A	22-06-2001
WO 2004114239 A	29-12-2004	NONE	

Electronic Acknowledgement Receipt

EFS ID:	5897796
Application Number:	12304653
International Application Number:	
Confirmation Number:	7360
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus Finkenzeller
Customer Number:	23364
Filer:	J. Ernest Kenney/Tiffany Stepney
Filer Authorized By:	J. Ernest Kenney
Attorney Docket Number:	FINK3009/JEK
Receipt Date:	17-AUG-2009
Filing Date:	04-MAR-2009
Time Stamp:	11:51:00
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS_081709.pdf	194011 251bcd6b6ad651f55cbaa21937127eb16a2ee1c8	yes	3

	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Filed (SB/08)		3	3	
Warnings:					
Information:					
2	Foreign Reference	EP1450299A1.pdf	1158335 6a9a589305e88aba671eed7ed6e37ea306326422	no	16
Warnings:					
Information:					
3	Foreign Reference	WO2006010943A1.pdf	2445444 709bb5c332fcbcbdd0411f43a2bb62ea64e91596	no	76
Warnings:					
Information:					
		Total Files Size (in bytes):	3797790		

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application
Klaus FINKENZELLER et al. **Confirmation No. 7360**

Application Number: 12/304,653 **Group Art Unit: 2194**

Filed: December 12, 2008 **Examiner: Unassigned**

Attorney Docket No. FINK3009/JEK

For: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to Rule 37 C.F.R. §1.51(b), §1.56, §1.97, and §1.98, this Information Disclosure Statement is submitted in the above-identified patent application. A listing of documents to be published on the face of any patent granted from this application is submitted herewith on Form PTO/SB/08. Any other documents or information submitted for consideration by the Examiner are listed in this paper. A copy of each U.S. and foreign patent, or each publication or portion thereof listed or herein identified is submitted herewith, except that (1) a copy of any U.S. patent application identified herein or any patent, publication or other information listed herein cited or submitted in a prior application relied upon for an earlier filing date under 35 U.S.C. §120 and identified below, is not submitted herewith, and (2) a copy of any U.S. patent or published patent application identified herein is not submitted herewith, if this application was filed or entered the U.S. national stage on or after June 30, 2003 (or if applicable, this international application entered the U.S. national stage on or after June 30, 2003).

Application Number: 12/304,653
Attorney Docket: FINK3009/JEK

CONCISE STATEMENT OF RELEVANCY (NON-ENGLISH LANGUAGE DOCUMENTS ONLY)

The documents identified on the appended PTO/SB/08 form are mentioned in the International Search Report dated January 24, 2008 established in International Application No. PCT/EP2007/005185, of which this application is the U.S. national stage. The relevancy of each document is evident from the International Search Report, which is understood to be of record in this application.

STATEMENT OF TIMELINESS

This Information Disclosure Statement is submitted prior to the mailing date of the first Office Action on the merits received by Applicant in the above-identified application.

The Examiner is requested to acknowledge consideration of the information provided in this paper in accordance with prescribed procedures.

Respectfully submitted,
BACON & THOMAS, PLLC

J. ERNEST KENNEY
Attorney for Applicant
Registration No. 19,179

Customer 23364

BACON & THOMAS, PLLC
625 Slaters Lane - 4th Floor
Alexandria, VA 22314-1176
Telephone: (703) 683-0500
Facsimile: (703) 683-1080

Date: August 17, 2009

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/304,653	03/04/2009	Klaus Finkenzeller	FINK3009/JEK

CONFIRMATION NO. 7360

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

PUBLICATION NOTICE

OC000000037244711

Title:DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

Publication No.US-2009-0199206-A1
Publication Date:08/06/2009

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
12/304,653	Klaus Finkenzeller	FINK3009/JEK

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

INTERNATIONAL APPLICATION NO.	
PCT/EP2007/005185	
I.A. FILING DATE	PRIORITY DATE
06/12/2007	06/12/2006

CONFIRMATION NO. 7360
371 ACCEPTANCE LETTER

OC000000035666278

Date Mailed: 04/29/2009

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

03/04/2009	03/04/2009
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 12/12/2008
- English Translation of the IA filed on 12/12/2008
- Copy of the International Search Report filed on 12/12/2008
- Preliminary Amendments filed on 12/12/2008
- Oath or Declaration filed on 03/04/2009
- Request for Immediate Examination filed on 12/12/2008
- U.S. Basic National Fees filed on 12/12/2008
- Priority Documents filed on 12/12/2008

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

KAREN M WILLIAMS

Telephone: (703) 756-1464

FORM PCT/DO/EO/903 (371 Acceptance Notice)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/304,653	03/04/2009	2183	2566	FINK3009/JEK	48	2

CONFIRMATION NO. 7360

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

FILING RECEIPT

OC00000035666277

Date Mailed: 04/29/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Klaus Finkenzeller, Unterföhring, GERMANY;
Karl Eglof Hartel, München, GERMANY;
Denny Brandl, Eching, GERMANY;

Power of Attorney: The patent practitioners associated with Customer Number 23364

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/EP2007/005185 06/12/2007

Foreign Applications

GERMANY 10 2006 027 200.5 06/12/2006

If Required, Foreign Filing License Granted: 04/24/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/304,653**

Projected Publication Date: 08/06/2009

Non-Publication Request: No

Early Publication Request: No

Title

DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

Preliminary Class

712

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SA 1409

ATTORNEY/DOCKET NO: FINK3009/JEK

DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled:

DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

the specification of which (check one):

☐ is attached hereto, or ☒ was filed on: June 12, 2007 as PCT International Application Number:PCT/EP2007/005185 and (if applicable) was amended on:

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations, §1 56* I hereby claim foreign priority benefits under *Title 35, United States Code §119* of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)			PRIORITY CLAIMED	
Number	Country	Day/Month/Year Filed	Yes	No
10 2006 027 200.5	GERMANY	12 June 2006	X	

☐ Additional Priority Application(s) Listed on Following Page(s)

I HEREBY CLAIM THE BENEFIT UNDER TITLE 35 U.S. CODE §119(E) OF ANY U.S. PROVISIONAL APPLICATIONS LISTED BELOW.	
Application Number	Day/Month/Year Filed

☐ Additional Provisional Application(s) Listed on Following Page(s)

I hereby claim the benefit under *Title 35, United States Code, §120* of any United States application(s) or PCT international application(s) designating The United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of *Title 35. United States Code, §112*, I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37. Code of Federal Regulations, §1 56* which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Number	Filing Date	Status - Patented, Pending or Abandoned

☐ Additional US/PCT Priority Application(s) listed on Following Page(s)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under *section 1001 of title 18 of the United States Code* and that such willful false statements may jeopardize the validity of the application or any patent issued thereon

POWER OF ATTORNEY: I (We) hereby appoint as my (our) attorneys, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, the practitioners associated with:

Customer Number 23364

I(we) authorize my(our) attorneys to accept and follow instructions from_____ regarding any matter related to the preparation, examination, grant and maintenance of this application, any continuation, continuation-in-part or divisional based thereon, and any patent resulting therefrom, until I(we) or my(our) assigns withdraw this authorization in writing

Send correspondence to **Customer 23364**

BACON & THOMAS, PLLC
625 Slaters Lane - 4th Floor
Alexandria, VA 22314-1176

Telephone Calls to: **J. Ernest Kenney**
(703) 683-0500

FULL NAME OF FIRST OR SOLE INVENTOR	CITIZENSHIP
Klaus FINKENZELLER	GERMANY
RESIDENCE ADDRESS Ahornstrasse 19 85774 Unterföhring, Germany	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE X 2009-01-19	SIGNATURE X Klaus Finkenzeller

☒ *See following page(s) for additional joint inventors*

CONTINUATION OF DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

PRIOR FOREIGN APPLICATION(S) (35 USC §119)			PRIORITY CLAIMED	
Number	Country	Day/Month/Year Filed	Yes	No

PRIOR PROVISIONAL APPLICATIONS 35 U.S. CODE §119(E)	
Application Number	Day/Month/Year Filed

PRIOR U.S. OR PCT INTERNATIONAL APPLICATIONS (35 U.S. CODE §120)		
Application Number	Filing Date	Status - Patented, Pending or Abandoned

FULL NAME OF JOINT INVENTOR Karl Eglof HARTEL	CITIZENSHIP GERMANY
RESIDENCE ADDRESS Reutterstrasse 74 80689 München, Germany	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE X Jan 26, 2009	SIGNATURE X

FULL NAME OF JOINT INVENTOR Denny BRANDL	CITIZENSHIP GERMANY
RESIDENCE ADDRESS Pater-Rupert-Mayer-Strasse 3E 85386 Eching, Germany	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE X 2009-1-19	SIGNATURE X

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
RESIDENCE ADDRESS	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE	SIGNATURE

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
RESIDENCE ADDRESS	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE	SIGNATURE

☐ *See following page(s) for additional joint inventors*

Electronic Patent Application Fee Transmittal

Application Number:	12304653
Filing Date:	
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus FINKENZELLER
Filer:	J. Ernest Kenney/Angela Mapson
Attorney Docket Number:	FINK3009/JEK

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Oath/decl > 30 months from priority date	1617	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt

EFS ID:	4903923
Application Number:	12304653
International Application Number:	
Confirmation Number:	7360
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus FINKENZELLER
Customer Number:	23364
Filer:	J. Ernest Kenney/Angela Mapson
Filer Authorized By:	J. Ernest Kenney
Attorney Docket Number:	FINK3009/JEK
Receipt Date:	04-MAR-2009
Filing Date:	
Time Stamp:	16:16:33
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$130
RAM confirmation Number	1766
Deposit Account	020200
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Oath or Declaration filed	Declaration.pdf	166470 e0b410896605b00c724ae3e86e28faae3ce75d27	no	2
Warnings:					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	30313 ce1b772ed1627237a66d653cefe99c3b11f01637	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	196783		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES NATIONAL STAGE SHEET (DO/EO)
Karen Williams, Paralegal

PUBLICATION NO. WO 87/ 14149
PUBLICATION DATE 21 DEC 87
U. S. APPL. NO. 12/304653
INTERNATIONAL APPL. EP87/05785

Application Filed By: 30 MOS

International Application ✓ Translation ✓ Defective ___ Reason ___

WIPO Designated EP Elected ___ IA Language GERMAN

Copy of Search Report (ISR) ✓ Article 33 ___ Article 19 ___

371 Filing fees ✓ paid ___ partial ___ none Pages ___

Total Claims 48 Chargeable 48 Independent 2 Multiple N

Total Drawing Sheets 4 Defective ___ Reason ___

Oath/Declaration needed ___ signed 04 MAR 09 defective ___ Reason ___

Small entity ___ Large entity ✓ Small entity statement/request ___

Biochemical Seq. Diskette ___ needed ___ damaged ___ entered ___ not entered ___

Biochemical Sequence listing ___ needed ___ statement ___ no statement ___

Copy of References Cited in ISR ___ Statement 37 CFR 3.73(b) ___

Copy of IPER ___ Annexes ___ entered ___ not entered ___ Reason ___

Preliminary Amendment entered ✓ not entered ___ Reason ___

Information Disclosure Statement ___ Request for Immediate Examination ✓

Substitute Specification ___ Assignment ___ Priority document ✓

Power of Attorney ___ Data Sheet ✓ RO/101 ___ PCT Easy ___

Other papers ___

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35 USC Receipt of Request 12 DEC 08
Date completion USC 371 Requirements 04 MAR 09
Notice of Missing Requirements ___
Notice of Defective ___ Translation ___ Declaration ___ Disk ___
Notice of Acceptance 24 APR 09
Notice of Abandonment ___
Notice of Missing Sequence ___

Best Available Copy

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 2, 2008

Application or Docket Number: 12/304653

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)	SMALL ENTITY RATE	SMALL ENTITY FEE	OR	LARGE ENTITY RATE	LARGE ENTITY FEE
U.S. NATIONAL STAGE FEES							
BASIC FEE	SMALL ENT.=$165	LARGE ENT.=$330	BASIC FEE		OR	BASIC FEE	330
EXAMINATION FEE	SMALL ENT. = $110	LARGE ENT. = $220	EXAM. FEE			EXAM. FEE	220
SEARCH FEE	U.S. is ISA = $50/$100 ALL other countries = $215/$430	ALL other situations = $270/$540	SEARCH FEE			SEARCH FEE	430
FEE FOR EXTRA SPEC. PGS.	minus 100 =	/ 50 =	X $ 135 =			X $ 270 =	
TOTAL CHARGEABLE CLAIMS	48 minus 20 =	28	X $ 26 =		OR	X $ 52 =	1456
INDEPENDENT CLAIMS	2 minus 3 =		X $ 110 =		OR	X $ 220 =	
MULTIPLE DEPENDENT CLAIM PRESENT	N		+ $ 195 =		OR	+ $ 390 =	
* If the difference in column 1 is less than zero, enter "0" in column 2			TOTAL		OR	TOTAL	2436

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
Total	*	Minus	**	=	X $ 26 =		OR	X $ 52 =	
Independent	*	Minus	***	=	X $ 110 =		OR	X $ 220 =	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐					+ $ 195 =		OR	+ $ 390 =	
					TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
Total	*	Minus	**	=	X $ 26 =		OR	X $ 52 =	
Independent	*	Minus	***	=	X $ 110 =		OR	X $ 220 =	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐					+ $ 195 =		OR	+ $ 390 =	
					TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than '20', enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than '3', enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET
(FOR USE WITH FORM PTO-875)

SERIAL NO. 12/ 304653
FILING DATE
APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
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TOTAL IND.			2			
TOTAL DEP.			46			
TOTAL CLAIMS			48			

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
51						
52						
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100						
TOTAL IND.						
TOTAL DEP.						
TOTAL CLAIMS						

PTO - 1360 (REV. 11/04)

U.S. DEPARTMENT of COMMERCE
Patent and Trademark Office

PTO-1390 (Rev. 09-08)
Approved for use through 2/28/2010 OMB 0651-0021
U S Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995. no persons are required to respond to a collection of information unless it displays a valid OMB control number

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
FINK3009/JEK	
U S APPLICATION NO (if known, see 37 CFR 1 5)	
INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE
PCT/EP2007/005185	June 12, 2007
PRIORITY DATE CLAIMED	
June 12, 2006	

TITLE OF INVENTION
DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA ...

APPLICANT(S) FOR DO/EO/US
Klaus FINKENZELLER et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1 ☑ This is a **FIRST** submission of items concerning a submission under 35 U S C 371

2 ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U S C 371

3 ☑ This is an express request to begin national examination procedures (35 U S C 371(f)) The submission must include items (5), (6), (9) and (21) indicated below

4 ☑ The US has been elected (Article 31)

5 ☑ A copy of the International Application as filed (35 U S C 371(c)(2))

- a ☐ is attached hereto (required only if not communicated by the International Bureau)
- b ☑ has been communicated by the International Bureau
- c ☐ Is not required, as the application was filed in the United States Receiving Office (RO/US)

6 ☑ An English language translation of the International Application as filed (35 U S C 371(c)(2))

- a ☑ is attached hereto
- b ☐ has been previously submitted under 35 U S C 154(d)(4)

7 ☑ Amendments to the claims of the International Application under PCT Article 19 (35 U S C 371(c)(3))

- a ☐ are attached hereto (required only if not communicated by the International Bureau)
- b ☐ have been communicated by the International Bureau
- c ☐ have not been made; however. the time limit for making such amendments has NOT expired
- d ☑ have not been made and will not be made

8 ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U S C 371(c)(3))

9 ☐ An oath or declaration of the inventor(s) (35 U S C 371(c)(4))

10 ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U S C 371(c)(5))

Items 11 to 20 below concern document(s) or information included:

11 ☐ An Information Disclosure Statement under 37 CFR 1 97 and 1 98

12 ☐ An assignment document for recording A separate cover sheet in compliance with 37 CFR 3 28 and 3 31 is included

13 ☑ A preliminary amendment

14 ☑ An Application Data Sheet under 37 CFR 1 76

15 ☐ A substitute specification

16 ☐ A power of attorney and/or change of address letter

17 ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1 821- 1 825

18 ☐ A second copy of the published International Application under 35 U S C 154(d)(4)

19 ☐ A second copy of the English language translation of the international application under 35 U S C 154(d)(4)

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U S APPLICATION NO (if known, see 37 CFR 1 5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
	PCT/EP2007/005185	FINK3009/JEK

20 Other items or information:

The following fees have been submitted	CALCULATIONS	PTO USE ONLY
21. ☑ Basic national fee (37 CFR 1 492(a)) $330	$ 330.00	
22. ☑ Examination fee (37 CFR 1 492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... $0 All other situations $220	$ 220.00	
23 ☑ Search fee (37 CFR 1 492(b)) If the written opinion of the ISA/US or the International preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... $0 Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... $100 International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... $430 All other situations $540	$ 430.00	
TOTAL OF 21, 22 and 23 =	$980.00	

☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1 492(j))
The fee is **$270** for each additional 50 sheets of paper or fraction thereof.

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round **up** to a whole number)	RATE	
- 100 =	/50 =		x $270	$

Surcharge of **$130.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1 492(h))	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	48 - 20 =	28	x $ 52	$ 1,456.00	
Independent claims	2 - 3 =	0	x $220	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $390	$	
			TOTAL OF ABOVE CALCULATIONS =	$ 2,436.00	
☐ Applicant claims small entity status See 37 CFR 1 27 Fees above are reduced by ½					
			SUBTOTAL =	$ 2,436.00	
Processing fee of **$130.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +				$	
			TOTAL NATIONAL FEE =	$ 2,436.00	
Fee for recording the enclosed assignment (37 CFR 1 21(h)) The assignment must be accompanied by an appropriate cover sheet (37 CFR 3 28, 3 31) **$40.00** per property +				$	
			TOTAL FEES ENCLOSED =	$ 2,436.00	
			Amount to be refunded:	$	
			Amount to be charged	$	

a ☐ A check in the amount of $ _____ to cover the above fees is enclosed

b ☑ Please charge my Deposit Account No 02-0200 in the amount of $ 2,436.00 to cover the above fees

c ☑ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No 02-0200

d ☐ Fees are to be charged to a credit card **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

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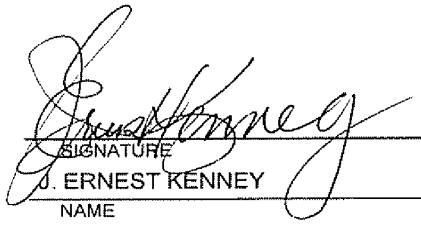
SEND ALL CORRESPONDENCE TO:



SIGNATURE

J. ERNEST KENNEY

NAME

19,179

REGISTRATION NUMBER

Application Data Sheet
Application Information

Application type::	Regular
Subject matter::	Utility
CD-ROM or CD-R::	None
Number of CD disks::	0
Number of copies of CDs::	0
Sequence submission?::	No
Computer readable form (CRF)?::	No
Number of copies of CRF::	0
Title::	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
Attorney docket number::	FINK3009/JEK
Request for early publication?::	No
Request for non-publication?::	No
Suggested drawing figure::	
Total drawing sheets::	4
Small entity?::	No

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Representative Information

Representative customer number:: 23364

Domestic Priority Information

Application::	Continuity Type::	Parent Application::	Parent Filing Date::
This application	an application claiming benefit under 35 USC 119(e)		
This application	National stage of	PCT/EP2007/005185	06/12/2007
This application	Continuation of		

Foreign Priority Information

Country::	Application number::	Filing Date::	Priority claimed::
GERMANY	10 2006 027 200.5	06/12/2006	YES

Assignee Information

Assignee name::

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

International Patent Application No. PCT/EP2007/005185

PCT/DO/EO/US

International Filing Date: June 12, 2007

Attorney Docket: FINK3009/JEK

Applicant: Klaus FINKENZELLER et al.

For: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

PRELIMINARY AMENDMENT BEFORE EXAMINATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

This paper accompanies documents submitted to initiate national stage processing of the above-identified international patent application.

AMENDMENTS

AMENDMENTS TO THE CLAIMS

The amendments to the claims appear in the following pages under the heading "LIST OF CURRENT CLAIMS". The claim listing replaces all previous versions of the claims presented in this application, and indicates any currently presented amendments and the status of each of the listed claims.

The amendments to the claims of this application, which originated in a foreign country, are submitted before examination on the merits and are not intended to have a narrowing effect for the purpose of patentability, but rather are made for one or more of the following reasons: (i) to remove drawing reference numerals unnecessary under U.S. practice; (ii) to remove or reduce multiple dependent claims to reduce the filing fee; (iii) to revise the original language originating in a foreign country to better conform to customary English usage and style for U.S. patent claiming; (iv) to revise original non-U.S. claim terminology into more appropriate English claim terms having a scope of meaning consistent with the original intended language in preparation for U.S.

examination; (iv) to remove limitations having an effect in a foreign country which is different and unintended under U.S. practice (i.e., changing "consisting of" to "comprising"); (v) to remove or amend original claim language that could be regarded as alternative expressions that are acceptable under foreign patent practice but possibly subject to objection under U.S. practice, typically having a broadening or neutral effect in the amended claim; and/or (vi) to improve the clarity or meaning of the original language.

In the case of amendments effectively changing an original claim element expressed as a "means plus function" that could raise a presumption of claim expression under 35 U.S.C. 112, 6th paragraph to a structural expression or to an expression removing the presumption of a "means-plus-function" statement, it is not intended to narrow the claim so amended for purposes of patentability, but rather to place the claim in a form considered to be intended by the applicant from a foreign country where claim limitations described in terms of means-plus-function do not have the same effect as under U.S. practice. Thus, such amendments are intended to establish a full range of equivalents to the claim elements so amended under the U.S. doctrine of equivalents and beyond the range associated with "means-plus-function" expressions according to 35 U.S.C. 112, 6th paragraph, just as if the claim so amended was presented originally in its amended form.

All rights are reserved to the original disclosed and claimed subject matter and any cancellation of claims is made without prejudice or disclaimer.

LIST OF CURRENT CLAIMS

1. (Currently Amended) A method for contactless communication of a reading device ~~(200)~~ with at least two communication-ready applications ~~(10, 20, 30)~~ located on a portable data carrier ~~(100)~~, comprising ~~characterized by~~ the steps [[of]]:
[[-]] generating a first communication-readiness signal to the reading device ~~(200)~~ for a first of the at least two applications ~~(10, 20, 30)~~, the communication-readiness signal comprising a first identification number ~~(UID1)~~ which is assigned to the first of the at least two applications ~~(10, 20, 30)~~ and indicates to the reading device ~~(200)~~ the communication readiness of said first application, and
[[-]] generating a second communication-readiness signal to the reading device ~~(200)~~ for a second of the at least two applications ~~(10, 20, 30)~~, the second communication-readiness signal comprising a second identification number ~~(UID2)~~ different from the first identification number ~~(UID1)~~, which is assigned to said second application and indicates to the reading device ~~(200)~~ the communication readiness of said second application.

2. (Currently Amended) The method according to claim 1, wherein ~~characterized in that~~ the first communication-readiness signal is generated for a first group ~~(G1)~~ of applications ~~(10A-40A)~~ comprising the first application, and the first identification number ~~(UID1)~~ is assigned to each of the applications ~~(10A-40A)~~ in the first group ~~(G1)~~, and the second communication-readiness signal is generated for a second group ~~(G2)~~ of applications ~~(10B-30B)~~ comprising the second application, and the second identification number ~~(UID2)~~ is assigned to each of the applications ~~(10B-30B)~~ in the second group ~~(G2)~~, the first communication-readiness signal indicating to the reading device ~~(200)~~ the communication readiness of each of the applications ~~(10A-40A)~~ of the first group ~~(G1)~~, and the second communication-readiness signal indicating to the reading device ~~(200)~~ the communication readiness of each of the applications ~~(10B-30B)~~ of the second group ~~(G2)~~.

3. (Currently Amended) The method according to claim 2, wherein ~~characterized in that~~ each of the applications ~~(10A-40A)~~ of the first group ~~(G1)~~ and/or each of the applications ~~(10B-30B)~~ of the second group ~~(G2)~~ is assigned additional selection information in each case.

4. (Currently Amended) The method according to claim 1, wherein ~~any of claims 1 to 3, characterized in that~~ the reading device ~~(200)~~ emits search signals, the signals generated for the applications ~~(10, 20, 30) being~~ comprising response signals to the search signals.

5. (Currently Amended) The method according to claim 1, including ~~any of claims 1 to 4, characterized by~~ the further step of toggling between the applications ~~(10, 20, 30)~~ for communication of the application ~~(10, 20, 30)~~ with a reading device ~~(200)~~.

6. (Currently Amended) The method according to claim 5, wherein ~~characterized in that~~ toggling is effected by branching or by context switching.

7. (Currently Amended) The method according to claim 1, wherein ~~any of claims 1 to 6, characterized in that~~ the reading device ~~(200)~~ selects for further communication one or more of the at least two applications ~~(10, 20, 30)~~ via the identification numbers ~~(UID1 UIDn)~~ assigned to the applications ~~(10, 20, 30)~~.

8. (Currently Amended) The method according to claim 7, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information in each case; and wherein ~~with claim 3, characterized in that~~ the reading device ~~(200)~~ selects for further communication one or more of the at least two applications ~~(10A 40A, 10B 30B, 10C 30C, 40D)~~ via the identification numbers ~~(UID1 UID3)~~ assigned to the applications ~~(10A 40A, 10B 30B, 10C 30C, 40D)~~ and via the additional selection information assigned to the applications ~~(10A 40A, 10B 30B, 10C 30C, 40D)~~.

9. (Currently Amended) The method according to claim 7, wherein ~~or 8, characterized in that~~ for one or more of the at least two applications ~~(10, 20, 30)~~ that have not yet been selected for further communication by the reading device ~~(200)~~, the communication-readiness signal is generated while the communication with one or more others of the at least two applications ~~(10, 20, 30)~~ that have been selected for further communication by the reading device ~~(200)~~ is not yet completed.

10. (Currently Amended) The method according to claim 7, wherein ~~any of claims 7 to 9, characterized in that~~ for one or more of the at least two applications ~~(10, 20, 30)~~ that

have not yet been selected for further communication by the reading device ~~(200)~~, the communication-readiness signal is generated after one or more others of the at least two applications ~~(10, 20, 30)~~ have been suspended after completion of communication with the reading device ~~(200)~~.

11. (Currently Amended) The method according to claim 7, wherein ~~any of claims 7 to 10, characterized in that~~ the data carrier ~~(100)~~ informs the reading device ~~(200)~~ by means of collision signals that one or more of the at least two applications ~~(10, 20,30)~~ that have not yet been selected for further communication by the reading device ~~(200)~~ are present by signals being sent that simulate a collision between a plurality of applications ~~(10, 20, 30)~~.

12. (Currently Amended) The method according to claim 7, wherein ~~any of claims 7 to 10, characterized in that~~ the data carrier ~~(100)~~ informs the reading device ~~(200)~~ by means of an allocation of one or more time slots that one or more of the at least two applications ~~(10, 20, 30)~~ that have not yet been selected for further communication by the reading device ~~(200)~~ are present.

13. (Currently Amended) The method according to claim 7, including ~~any of claims 7 to 12, characterized by~~ the further step of storing information in a nonvolatile memory of the data carrier ~~(100)~~ about which of the at least two applications ~~(10, 20, 30)~~ was last selected for further communication by the reading device ~~(200)~~.

14. (Currently Amended) The method according to claim 7, including ~~any of claims 7 to 12, characterized by~~ the further step of storing information in a nonvolatile memory of the data carrier ~~(100)~~ about which of the at least two applications ~~(10, 20, 30)~~ has already completed active communication with the reading device ~~(200)~~.

15. (Currently Amended) The method according to claim 13, wherein ~~or 14, characterized in that~~ upon new communication of the reading device ~~(200)~~ with the data carrier ~~(100)~~, a communication-readiness signal is emitted first for one of the at least two applications ~~(10, 20, 30)~~ that is different from the application ~~(10, 20, 30)~~ designated by the stored information.

16. (Currently Amended) The method according to claim 13, wherein, ~~or 14, characterized in that~~ upon new communication of the reading device ~~(200)~~ with the data carrier ~~(100)~~, a communication-readiness signal is emitted first for the application ~~(10, 20, 30)~~ with which active communication was effected last.

17. (Currently Amended) The method according to claim 7, wherein ~~any of claims 7 to 16, characterized in that~~ the reading device ~~(200)~~ addresses an application ~~(10, 20, 30)~~ selected for further communication via a dynamically allocated session number ~~(CID1-CIDn)~~.

18. (Currently Amended) The method according to claim 17, wherein ~~characterized in that~~ upon addressing, the session number ~~(CID1-CIDn)~~ is linked on the data carrier ~~(100)~~ with the identification number ~~(UID1-UIDn)~~ assigned to the application ~~(10, 20, 30)~~.

19. (Currently Amended) The method according to claim 18, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information in each case; and wherein ~~with claim 3, characterized in that~~ upon addressing, the session number ~~(CID1-CID3)~~ is linked on the data carrier ~~(100)~~ additionally with the additional selection information assigned to the application ~~(10A-40A, 10B-30B, 10C-30C, 40D)~~.

20. (Currently Amended) The method according to claim 1, wherein ~~any of claims 1 to 19, characterized in that~~ the data carrier ~~(100)~~ recognizes by a response of the reading device ~~(200)~~ to communication-readiness signals emitted by the data carrier ~~(100)~~ whether the reading device ~~(200)~~ is set up to resolve a collision between a plurality of applications ~~(10, 20, 30)~~.

21. (Currently Amended) The method according to claim 1, wherein ~~any of claims 1 to 20, characterized in that~~ the reading device ~~(200)~~ communicates with a plurality of the at least two applications ~~(10, 20, 30)~~ in parallel.

22. (Currently Amended) The method according to claim 1, wherein ~~any of claims 1 to 21, characterized in that~~ the reading device ~~(200)~~ interprets the identification numbers ~~(UID1-UIDn)~~ as identification numbers of different data carriers.

23. (Currently Amended) The method according to claim 22, wherein each of the applications of the first group and/or each of the applications of the second group is assigned additional selection information in each case; and wherein ~~with claim 3, characterized in that~~ the data carrier ~~(100)~~ generates the additional selection information as a virtual sector assignment ~~(FS1-FS4)~~ and the reading device ~~(200)~~ interprets the additional selection information as a sector assignment ~~(FS1-FS4)~~ of a memory area of one of the different data carriers ~~(MA-MD)~~, whereas the different data carriers ~~(MA-MD)~~ may be emulated data carriers ~~(MA-MD)~~.

24. (Currently Amended) A contactlessly communicating portable data carrier ~~(100)~~, comprising at least two applications ~~(10, 20, 30)~~ stored thereon and a communication device ~~(70)~~ for controlling communication between a reading device ~~(200)~~ and the at least two applications ~~(10, 20, 30)~~, wherein ~~characterized in that~~ the communication device ~~(70)~~ is set up to generate communication-readiness signals to the reading device ~~(200)~~ which in each case indicate to the reading device ~~(200)~~ a communication readiness for one of the applications ~~(10, 20, 30)~~ and comprise an identification number assigned to the corresponding communication-readiness application ~~(10, 20, 30)~~.

25. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~characterized in that~~ the communication device ~~(70)~~ is set up to generate communication-readiness signals to the reading device ~~(200)~~ which in each case indicate to the reading device a communication readiness of each application ~~(10A-40A; 10B-30B; 10C-30C, 40D)~~ of a group ~~(G1; G2; G3)~~ of applications ~~(10A-40A; 10B-30B; 10C-30C, 40D)~~ comprising said application and comprise an identification number ~~(UID1; UID2; UID3)~~ assigned to each of the applications ~~(10A-40A, 10B-30B; 10C-30C, 40D)~~ of the group ~~(G1; G2; G3)~~.

26. (Currently Amended) The data carrier according to claim 25, wherein ~~characterized in that~~ the communication device ~~(70)~~ is set up to assign additional selection information to each of the applications ~~(10A-40A; 10B-30B; 10C-30C, 40D)~~ of the group ~~(G1; G2; G3)~~.

27. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 26, characterized in that~~ the communication device ~~(70)~~ is set up to

generate the communication-readiness signals as response signals to search signals received from a reading device ~~(200)~~.

28. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, including ~~any of claims 24 to 27, characterized by~~ a toggling device ~~(50)~~ which is set up to toggle between the applications ~~(10, 20, 30)~~ of the data carrier ~~(100)~~ for communication of the applications ~~(10, 20, 30)~~ with a reading device ~~(200)~~.

29. (Currently Amended) The data carrier ~~(100)~~ according to claim 28, wherein ~~characterized in that~~ the toggling device ~~(50)~~ is set up to toggle between the applications ~~(10, 20, 30)~~ of the data carrier ~~(100)~~ by means of branching or context switching.

30. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 29, characterized in that~~ the communication device ~~(70)~~ is set up to establish the communication between a reading device ~~(200)~~ and an application ~~(10, 20, 30)~~ addressed by the reading device ~~(200)~~ via a session number ~~(CID1-CIDn)~~.

31. (Currently Amended) The data carrier ~~(100)~~ according to claim 30, wherein ~~characterized in that~~ the communication device ~~(70)~~ is set up to link, upon addressing of the application ~~(10, 20, 30)~~, the session number ~~(CID1-CIDn)~~ with the identification number ~~(UID1-UIDn)~~ assigned to the application ~~(10, 20, 30)~~.

32. (Currently Amended) The data carrier ~~(100)~~ according to claim 31, wherein the communication device is set up to assign additional selection information to each of the applications of the group; and wherein ~~with claim 26, characterized in that~~ the communication device ~~(70)~~ is set up to link, upon addressing of the application ~~(10A-40A, 10B-30B, 10C-30C, 40D)~~, the session number ~~(CID1-CID3)~~ additionally with the additional selection information assigned to the application ~~(10A-40A, 10B-30B, 10C-30C, 40D)~~.

33. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 32, characterized in that~~ the communication device ~~(70)~~ is set up to determine those applications ~~(10, 20, 30)~~ among the at least two applications ~~(10, 20, 30)~~ that are ready for communication with a reading device ~~(200)~~.

34. (Currently Amended) The data carrier ~~(100)~~ according to claim 33, wherein ~~characterized in that~~ the communication device ~~(70)~~ is set up to emit communication-readiness signals for one or more of the at least two applications ~~(10, 20, 30)~~ that are ready for communication with a reading device ~~(200)~~ and not yet communicating with a reading device ~~(200)~~ while the communication with one or more others of the at least two applications ~~(10, 20, 30)~~ is not yet completed.

35. (Currently Amended) The data carrier ~~(100)~~ according to claim 33, wherein ~~or 34, characterized in that~~ the communication device ~~(70)~~ is set up to emit communication-readiness signals for one or more of the at least two applications ~~(10, 20, 30)~~ that are ready for communication with a reading device ~~(200)~~ and not yet communicating with a reading device ~~(200)~~ after one or more others of the at least two applications ~~(10, 20, 30)~~ have been suspended after completion of communication with a reading device ~~(200)~~.

36. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 35, characterized in that~~ the communication device ~~(70)~~ is set up to inform the reading device ~~(200)~~ via collision signals simulating a collision between a plurality of applications that one or more of the at least two applications ~~(10, 20, 30)~~ located on the data carrier ~~(100)~~ that have not yet been selected for further communication by the reading device ~~(200)~~ are present.

37. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 36, characterized in that~~ the communication device ~~(70)~~ is set up to store information in a nonvolatile memory of the data carrier ~~(100)~~ about which of the at least two applications ~~(10, 20, 30)~~ last communicated with a reading device ~~(200)~~.

38. (Currently Amended) The data carrier ~~(100)~~ according to claim 37, wherein ~~characterized in that~~ the communication device ~~(70)~~ is set up to emit, upon new contacting of a reading device ~~(200)~~ with the data carrier ~~(100)~~, a communication-readiness signal first for one of the at least two applications ~~(10, 20, 30)~~ that is different from the application ~~(10, 20, 30)~~ designated by the stored information.

39. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 38, characterized in that~~ the communication device ~~(70)~~ is set up to recognize by a response of a reading device ~~(200)~~ to communication-readiness signals emitted by the communication device ~~(70)~~ whether the reading device ~~(200)~~ is set up to resolve collisions between a plurality of applications.

40. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 39, characterized in that~~ the data carrier ~~(100)~~ is configured as a contactlessly communicating chip card, contactlessly communicating label, contactlessly communicating identification document or as a (U)SIM mobile communication card.

41. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 40, characterized in that~~ the data carrier ~~(100)~~ has a dual interface and can be operated both contactlessly and with contact.

42. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 39, characterized in that~~ the data carrier ~~(100)~~ is configured as a security module in a device comprising communication means for contactless communication, the security module having software means for communicate contactlessly via the communication means of the device.

43. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, including ~~any of claims 24 to 42, characterized by~~ a memory ~~(60)~~ which is divided into sectors ~~(S1-S11)~~, each of the sectors ~~(S1-S11)~~ having no more than one of the at least two applications ~~(10A-40A, 10B-30B, 10C-30C, 40D)~~ stored therein in each case.

44. (Currently Amended) The data carrier ~~(100)~~ according to claim 43, wherein the communication device is set up to assign additional selection information to each of the applications of the group; and wherein ~~with claim 26, characterized in that~~ the communication device ~~(70)~~ is set up to assign ~~(FS1-FS4)~~ the at least two applications ~~(10A-40A; 10B-30B; 10C-30C, 40D)~~ the additional selection information in the form of a virtual sector assignment and to generate communication-readiness signals for the groups ~~(G1; G2; G3)~~ of applications, the groups ~~(G1; G2; G3)~~ in each case comprising

applications ~~(10A-40A, 10B-30B, 10C-30C, 40D)~~ with pairwise different virtual sector assignments ~~(FS1-FS4)~~.

45. (Currently Amended) The data carrier ~~(100)~~ according to claim 43, wherein ~~or 44, characterized in that~~ each of the sectors ~~(S1-S11)~~ is access-protected separately for access by a reading device ~~(200)~~ to applications ~~(10A-40A, 10B-30B, 10C-30C, 40D)~~ stored in said sectors.

46. (Currently Amended) The data carrier ~~(100)~~ according to claim 24, wherein ~~any of claims 24 to 39, characterized in that~~ the data carrier ~~(100)~~ is configured as an electronic device, ~~in particular as a mobile terminal,~~ with a contactless interface for communication with a reading device ~~(200)~~ and with a plurality of memories, each of the memories having no more than one of the at least two applications ~~(10, 20, 30)~~ stored therein in each case.

47. (Currently Amended) The data carrier ~~(100)~~ according to claim 46, wherein ~~characterized in that~~ the contactless interface is configured as an NFC interface and the data carrier ~~(100)~~ is set up to be operated in the passive mode for communication with a reading device ~~(200)~~.

48. (Currently Amended) The data carrier ~~(100)~~ according to claim ~~46 or 47~~, wherein ~~characterized in that~~ the memories are formed on chip cards, in particular (U)SIM mobile communication cards, secure digital memory cards or EMV payment cards, integrated into the data carrier ~~(100)~~.

REMARKS

Examination of the application as-amended is respectfully requested.

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Data carrier and method for contactless communication between the data carrier and a reading device

[0001] The present invention relates to a method for contactless communication of at least two applications stored on a common portable data carrier with a reading device, and to an accordingly set up data carrier. A data carrier according to the invention may be e.g. a contactlessly communicating chip card, a contactlessly communicating label, a contactlessly communicating identification document, a security module SAM (secure application module) equipped for contactless communication, or an electronic device, such as a mobile terminal with an NFC interface, equipped for contactless communication.

[0002] In the prior art (e.g. Finkenzeller, Klaus: RFID-Handbuch, Munich, 2002) there are described various contactlessly communicating data carriers, for example chip cards and RFID transponders (radio frequency identification transponders), e.g. according to the standard ISO/IEC 14443. These are so-called proximity coupling chip cards, which are frequently used in the application field of ticketing, that is, as public transport tickets for example. The energy supply to the data carrier is normally effected here by the magnetic alternating field of a reading device. The range of such a data carrier is approx. 7 to 15 cm. The invention is not restricted to transponder chip cards with such short ranges, however, but can also be used in connection with other contactlessly communicating data carriers with other ranges and/or according to other standards. It is fundamentally also possible to use data carriers with their own energy source.

[0003] When such a data carrier is brought into the response field of a reading device, thereby commencing its energy supply and putting it in an operational mode, it can receive a search signal emitted cyclically by the reading device and indicate its communication readiness to the reading device by means of a first response signal. As soon as the reading device has received this signal it starts a selection process using a so-called anti-collision method in order to specifically select one data carrier for further communication when a plurality of communication-ready data carriers are located in the response field of the reading device at the same time. However, there are also

reading devices that communicate via proprietary, nonstandard communications protocols and do not support any anti-collision methods.

[0004] The selection of a data carrier is effected in the case of an anti-collision method on the basis of a unique identification number of the data carrier, for example a UID (unique identifier), a PUPI (pseudo-unique PICC identifier, PICC = proximity ICC, ICC = integrated circuit card) or the like. For data carriers according to ISO/IEC 14443 it further holds that a data carrier selected for communication is addressable during communication via a unique session number (session-ID, CID) allocated dynamically by the reading device. In this state such a data carrier no longer responds to the aforementioned search signals still emitted by the reading device. In this way the reading device can select further data carriers located in the response field via their unique identification numbers and also assign them unique session numbers in turn. According to ISO/IEC 14443, up to 16 data carriers can in this way be selected for communication at the same time and addressed accordingly via 16 different session numbers. A command emitted by the reading device and addressed by means of the session number is then always processed only by the data carrier to which said session number was assigned.

[0005] Further, it is known that a plurality of applications can be located on a portable data carrier at the same time and that the corresponding application processes can be executed concurrently when an operating system providing the necessary mechanisms is set up on the data carrier. Concurrent execution of processes means that the latter are executed quasi at the same time by repeatedly toggling between different processes. Toggling between different processes means that said processes are supplied to the processor alternatingly to obtain actual computing time. An application process designates an application that is undergoing execution. In the context of this invention, both an application and the associated application process will hereinafter always be designated as an application.

[0006] It is possible to address a plurality of different concurrent applications, for example via their application identifiers AIDs, via different logical channels. Logical channels make it possible to set a plurality of virtual channels in parallel via a single

interface by the corresponding communications protocols being so designed that the addressed logical channel is also coded. In this way a plurality of applications on the data carrier can thus be addressed in parallel via the application identifier by specification of the particular channel to be used.

[0007] The currently common protocols and the coding of the data to be transferred (APDU, application protocol data unit, a form of data transfer based on a command/response scheme) allow up to four logical channels which are coded by means of two special bits. However, the data carrier's responses generated upon a command received from outside the data carrier no longer contain any information about the logical channel. This has the consequence that external applications desiring to communicate with a plurality of concurrent applications on a data carrier must be synchronized with each other, since an external application cannot decide by the response of an application of the data carrier whether it is the response expected by it or is intended for another external application.

[0008] The management of logical channels is very elaborate for an operating system of the data carrier and requires a great amount of memory, all the more so if communication has to take place under secure conditions, i.e. the data belonging to an application are transferred in encrypted form and are protected in general against spying by other applications.

[0009] Problems also occur in cases where a plurality of possibly proprietary applications that were hitherto each stored as the only application on a separate data carrier are now to be integrated on a common data carrier configured as a multiapplication data carrier. In addition to the above-described difficulties in parallel communication, collisions can take place in the data structures, because the different applications have for example hitherto identified different contents on different data carriers by identical file identifiers FIDs that now identify only one file on the common data carrier. It also happens that applications from different data carriers are to be integrated that are subject to different restrictions in the communications parameters, such as the block length of transferable blocks.

[0010] It is the object of the present invention to specify a method permitting contactless communication of a plurality of mutually uncoordinated applications of a portable data carrier with a reading device, as well as an accordingly set up data carrier.

[0011] This object is achieved by a method and data carrier having the features of the independent claims. Advantageous embodiments and developments are stated in dependent claims.

[0012] The present inventive method is based on the idea that, for at least two applications located on a portable, contactlessly communicating data carrier that are ready to communicate with a reading device, a first communication-readiness signal to the reading device is generated for a first of the at least two applications, the signal comprising a first identification number assigned to the first of the at least two applications and indicating to the reading device the communication readiness of said first application, and a second communication-readiness signal to the reading device is generated for a second of the at least two applications, the second signal comprising a second identification number different from the first identification number, which is assigned to the second application and indicates to the reading device the communication readiness of said second application. These steps are carried out by an accordingly set up communication device on the data carrier.

[0013] The identification numbers perform the role played in the prior art by the identification number (UID, PUPI and the like) assigned to the data carrier. The reading device can thus address one application of a plurality of applications located on a data carrier selectively and independently of the data carrier via the identification number. A customary reading device has the impression of communicating with different data carriers.

[0014] In this connection it is also possible that the communication-readiness signals are generated in each case for groups of applications and indicate to the reading device the communication readiness of each of the corresponding applications of the particular group. All applications in such a group are assigned the same identification number here. It is possible to assign each of the applications in a group additional se-

lection information which permits the applications within a group to be distinguished. In this way the applications can be arranged in a hierarchical manner.

[0015] When the communication of an application with a reading device is spoken of hereinafter, this will always mean the communication taking place via a communication device of the data carrier, whereby the reading device selectively addresses said application and the data directed to the application are passed on to said application via the communication device of the data carrier. This holds in particular also when the data carrier has further communication-ready applications located thereon, or applications that are already communicating with the reading device or have already been suspended by the reading device after completion of communication.

[0016] The signals from the data carrier generated for the applications can be e.g. periodically emitted signals or specific response signals to search signals emitted by the reading device. The reading device can thus recognize which communication-ready applications are located in its response field even when they are stored on a common data carrier.

[0017] A toggle functionality present on the data carrier can toggle between different applications executed on the data carrier concurrently. In this way a plurality of applications can be engaged in communication with the reading device quasi simultaneously, whereby the toggling between said applications permits parallel communication thereof with the reading device via the communication device. However, the communication also can take place consecutively rather than in parallel, adapted to the abilities of the reading device.

[0018] The aforementioned restrictions in connection with the use of logical channels cease to exist. It is possible for more than four applications to communicate with the reading device in parallel. The communication device ensures that all data that are sent to the data carrier by the reading device are processed only by the addressed application. It ensures in particular that all data emitted to the reading device by the data carrier are so constituted that the reading device can assign them uniquely to one application.

[0019] Finally, there results the advantage that a plurality of applications can be integrated on a common data carrier independently of each other and without having to be mutually coordinated, since toggling between the applications allows each of the applications to have its own data structures, for example a file system, and its own software means, such as program code only used by it. Collisions with further applications regarding these resources are thus ruled out.

[0020] The toggle functionality can be configured as part of the operating system. The toggle between different applications can be effected e.g. by branching. In branching, a so-called parent process starts a new process, the child process. Both processes, parent and child, use the same system resources, such as working memory. A toggle can, on the other hand, e.g. also be effected by a context switch by means of a dispatcher. Here, the particular process currently assigned to the processor is given its own context which comprises for example areas in the main memory and system variables.

[0021] The reading device selects an application for further communication by means of the identification number assigned to the application. The additional selection information optionally assigned to the application can also be used for selection by the reading device. An application selected for further communication is then assigned a session number dynamically by the reading device. Via said session number the application can be addressed uniquely during communication with the reading device. Upon addressing, the session number is so linked in the data carrier by the communication device with the identification number assigned to the application and optionally the additional selection information that the correct application is always addressed upon communication. When an application has been selected for further communication by the reading device, said communication takes place subsequently without requiring any further steps. An application selected for further communication by the reading device is thus then engaged in communication with the reading device.

[0022] According to the method, the data carrier generates communication-readiness signals for one or more applications located on the data carrier that have not yet been selected for further communication by the reading device even when one or

more other applications have already been selected for further communication by the reading device and the communication with said other applications is not yet completed. This is preferably also the case after one or more other applications have already been suspended by the reading device after completion of communication. A further activity of the application suspended by the reading device on the data carrier, separately from the communication with the reading device, is still possible.

[0023] While according to the prior art a data carrier engaged in communication does not respond to search signals and a suspended data carrier either must first be removed from the response field of the reading device and be brought back into it to be communication-ready again, or is reset by a RESET signal from the reading device, a reading device can establish contact with all communication-ready applications of the inventive data carrier at any time.

[0024] The communication device controls the total communication between the applications and the reading device and always knows the communication status of each application: communication-ready or selected by the reading device for further communication and thus communicating with the reading device or suspended by the reading device after completion of communication.

[0025] The data carrier informs the reading device preferably by means of collision signals that communication-ready applications that have not yet been selected for further communication are present in the response field. Said signals, which are emitted during execution of the collision algorithm, can take the form for example of simulated collisions between a plurality of applications. The reading device will then emit search signals in parallel with the communication with other applications and/or after the end of communication in order to establish contact with the applications not yet selected for communication.

[0026] The communication device of the data carrier can preferably recognize by the responses of the reading device to emitted communication-readiness signals whether the reading device is able to resolve a collision between a plurality of applications. In this connection a termination of communication by the reading device in case more than one data carrier is located in the response field of the reading device can

also be interpreted as a response of the reading device. If the data carrier recognizes, for example, that the reading device can always process only one application in its response field, the emission of further communication-readiness signals can be adapted thereto. The data carrier thereafter emits a communication-readiness signal for an application only when the reading device has completed communication with another application.

[0027] The method preferably stores in a nonvolatile memory, by means of the communication device, information about which of the applications was last selected for further communication by the reading device. This makes it possible to ascertain upon reactivation of the data carrier, for example after an interruption of the energy supply, which application last communicated with the reading device, to then generate a communication-readiness signal first for an application different therefrom, in order e.g. to prevent the same application from always being served first and other applications from possibly having to put up with long waiting periods or not being executed at all.

[0028] The method can therefore be so designed that the reading device can communicate with a plurality of applications in parallel. The identification numbers assigned to the applications are preferably so selected here that the reading device interprets them like identification numbers of different data carriers. The inventive method can then be carried out with reading devices according to the prior art without any problems.

[0029] In the case of reading devices expecting to communicate with MIFARE memory cards with memories organized in sectors and applications each firmly assigned to one of the sectors, it is possible to use the additional selection information as sector information. Use of the sector information produces a virtual sector assignment of the individual applications that corresponds to that of a MIFARE memory card. In this way it is possible to emulate a MIFARE memory card by means of a modern data carrier, by a memory of the data carrier appearing to the reading device as a sectored memory by means of the sector information. It is preferably not recognizable to the

reading device whether a genuine MIFARE memory card is physically present or whether an inventive emulated MIFARE memory card is involved.

[0030] Each sector of such an emulated MIFARE card has exactly one application stored therein. Each individual sector is preferably access-protected separately for a reading device accessing it, usually by a pair of keys assigned to the sector. It is thus also possible for those applications to be stored executably on a data carrier that were assigned to corresponding fixed sectors on different original MIFARE memory cards. Those applications that were assigned to originally different fixed sectors are preferably then combined into groups with a common identification number. The reading device accordingly interprets a thus configured data carrier as a multiplicity of MIFARE memory cards, whereby each of said MIFARE memory cards comprises exactly one group of applications that reside in pairwise different sectors. In this way the reading device can first select via the identification number a group of applications that correspond e.g. to the applications of a single original MIFARE memory card. Thereafter a special application which was e.g. originally firmly assigned to the sector 1 can be selected on the basis of the additional selection information in the form of the virtual sector assignment.

[0031] The inventive data carrier can be configured in general as a contactlessly communicating chip card, contactlessly communicating label or contactlessly communicating identification document. Further, it is possible that the data carrier is configured as a security module SAM (secure application module) in a device set up for contactless data transmission, the security module having software means for communicating contactlessly by means of a suitable interface with the help of the device. A SAM is a component secured both mechanically and by software means which serves to store secret data and to execute cryptoalgorithms.

[0032] Further, an electronic device, in particular a mobile terminal, with a contactless interface for communication with a reading device and with a plurality of access-protected memory areas on different storage media of the device can also be designed as an inventive data carrier. Each of the memory areas has an application stored therein. The memory areas are preferably formed on one or more storage media, in

particular secure chip cards, which are integrated into the mobile terminal. These may be for example (U)SIM mobile communication cards, SD cards (secure digital memory cards) or EMV payment cards. EMV designates a specification for payment cards and is derived from "Europay", "MasterCard", and "Visa". By means of the inventive method it is then possible that the reading device communicates with each of the applications on the different secure chip cards via the contactless interface of the mobile terminal. The contactless interface is preferably configured as an NFC interface ("near field communication"). This permits a so-called "secure NFC" with a device in the role of a passive communication partner and with a plurality of applications stored thereon.

[0033] The invention will hereinafter be explained by way of example with reference to the accompanying drawings. Therein are shown:

Figure 1 a schematic representation of a first embodiment of an inventive data carrier;

Figure 2 a flow chart of a sequence of activities in a first embodiment of the inventive method;

Figure 3 a flow chart of a sequence of activities in a second embodiment of the inventive method; and

Figure 4 a schematic representation of a second embodiment of an inventive data carrier.

[0034] Different embodiments of the invention will hereinafter be presented in more detail. Figure 1 shows schematically a first embodiment of an inventive data carrier 100 and a reading device 200. The data carrier 100 has at least two applications 10, 20, 30 located thereon. The data carrier 100 comprises a communication device 70 and a toggling device 50 that is set up to toggle between the different applications 10, 20, 30. Each of the applications 10, 20, 30 is assigned an identification number UID1, UID2, UIDn. The identification numbers UID1, UID2, UIDn are managed by the communication device 70. When the reading device 200 enters into communication with one or more of the applications 10, 20, 30 of the data carrier 100, the reading device can se-

lect them for further communication via the identification numbers UID1, UID2, UIDn and address them in the further course of communication by means of session numbers CID1, CID2, CIDn allocated dynamically by it. Said session numbers CID1, CID2, CIDn can be linked by the communication device 70 with the identification numbers of the particular applications addressed. All communication between the applications 10, 20, 30 of the data carrier 100 with the reading device 200 takes place via the communication device 70, it being possible to toggle between the applications 10, 20, 30 by means of the toggling device 50.

[0035] Figure 2 shows a flow chart of a sequence of activities in a first embodiment of the inventive method. The numbers designate individual method steps and states of individual components. When the inventive data carrier 100, which at the onset is in the non-operational state 0, passes into the response field of a reading device 200, it becomes operational 1000 and receives a search signal 300 from the reading device 200. The communication device 70 of the data carrier 100 generates for a first application 10 a communication-readiness signal which comprises the identification number UID1 assigned to the application 10, 1010. Said signal is emitted by the data carrier, and the application 10 is selected for further communication by the reading device 200 in the course of the selection process 400 by means of an anti-collision method.

[0036] While or before the reading device 200 communicates with the application 10 of the data carrier 100, 2010, which it addresses via the session number CID1, 510, it emits further search signals 300, and the communication device 70 of the data carrier 100 generates for a second application 20 a communication-readiness signal comprising the identification number UID2, 1020, and the application 20 is selected for further communication by the reading device 200 in the course of the selection process 400. The reading device 200 is now engaged in communication with the two applications 10 and 20 in parallel, 2010, 2020, which are addressed via the session numbers CID1, 510, and CID2, 520.

[0037] The establishment of communication of the reading device 200 with the application 30 follows analogously by a search signal 300, a communication-readiness signal generated by the communication device 70, 1030, a selection step 400, so that

the reading device 200 is finally communicating in parallel with the three applications 10, 20, 30, 510, 520, 530, addressed via the session numbers CID1, CID2, CIDn, 2010, 2020, 2030. As indicated, the method can continue with further applications in the same manner.

[0038] To the reading device 200 the different applications of the inventive data carrier 100 appear to be a collection of different data carriers according to the prior art.

[0039] Figure 3 shows a flow chart of a sequence of activities in a second embodiment of the inventive method. The numbers designate, as in Figure 2, individual method steps and states of individual components. The chief difference compared to the embodiment shown in Figure 2 is that in the present example the reading device does not communicate with a plurality of applications by means of different session numbers at the same time, but with different applications in succession.

[0040] Steps and states that are the same as those in Figure 2 are designated the same way and will not be explained again. After emission of a search signal 300 by the reading device 200, the communication device 70 of the data carrier 100 generates for a first application 10 a communication-readiness signal which comprises the identification number UID1 assigned to the application 1010, and the application 10 is selected for further communication by the reading device 200 in the course of the selection process 400 by means of an anti-collision method. The reading device 200 is communicating 2000 with the application 10, 610, and completes this communication before it emits new search signals. Therebefore the application 10 must be suspended 700, for example by means of a DESELECT command, whereby the inventive data carrier still remains operational 1000 and can thus respond to the next search signal 300 from the reading device 200 with a communication-readiness signal generated for a second application 20 and comprising the identification number UID2 assigned to the application 20. An analogous process can now follow sequentially for all applications located on the data carrier. Figure 3 also shows the communication of the reading device with the applications 20 and 30, 620, 630.

[0041] The data carrier 100 is preferably set up to recognize whether the reading device 200 is able to handle a plurality of communication-ready applications located in

its response field and to resolve any collisions occurring. The data carrier 100 evaluates for this purpose e.g. the response of the reading device 200 to communication-readiness signals emitted in parallel, and thereby recognizes the abilities of the reading device 200 for collision handling. A termination of communication by the reading device 200 can also be considered a response, if for example a reading device 200 is involved that can fundamentally process only one data carrier in its response field. If a plurality of data carriers are then located in the response field, the reading device terminates all communication with a data carrier. The data carrier 100 can thus for example toggle from a method according to the first embodiment to a method according to the second embodiment if the reading device 200 is not able to resolve collisions.

[0042] The inventive data carrier 100 possesses a further possibility for indicating to the reading device 200 that communication-ready applications are located in the response field, by the communication device 70 being able to emit signals during the course of an anti-collision method 400 that simulate the collision of at least two data carriers for the reading device 200. The reading device 200 will then try to establish contact with such applications at a later time. The signal or data pattern emitted for simulating a collision may be e.g. a code violation (e.g. ISO 14443 type A: Manchester code with simultaneous sending of a "0" and a "1") or a checksum error. In the case of anti-collision methods with several time slots (e.g. ISO 14443 type B: slotted Aloha method) the different identification numbers UID1, UID2, UIDn of the applications 10, 20, 30 located on the data carrier can be emitted in different time slots to simulate the presence of corresponding data carriers for the reading device 200.

[0043] For the reading device 200 there is also the possibility of briefly switching off the magnetic field to then, if data carriers without their own energy supply are involved, after their restart (power-on reset) select a new data carrier in the response field. According to the invention, the communication device 70 of the data carrier 100 can be set up to store in a nonvolatile memory of the data carrier 100 information about which of the applications 10, 20, 30 last communicated with the reading device 200, which of the applications 10, 20, 30 already completed active communication with the reading device 200, and the like. With the help of such information it is then possible e.g. to generate a communication-readiness signal first for an application 10,

20, 30 that did not communicate with the reading device 200 last, in order e.g. to prevent the same application 10, 20, 30 from always being served first and other applications 10, 20, 30 from possibly having to put up with long waiting periods or not being executed at all. It is also possible, however, to first generate a communication-readiness signal for that application 10, 20, 30 with which the reading device 200 actively communicated last, in order for example to bring to an end a data communication that was commenced but not completed.

[0044] Figure 4 shows a second embodiment of an inventive data carrier 100 that can emulate one or more MIFARE memory cards MA, MB, MC, MD. MIFARE memory cards MA-MD possess a memory divided into the sectors FS1, FS2, FS3, FS4, each sector FS1-FS4 having no more than one application stored therein. Each sector FS1-FS4 is protected against unauthorized accesses separately by its own key pair, i.e. only a reading device 200 possessing the corresponding keys of a sector FS1-FS4 can access the corresponding sector FS1-FS4 and the data stored therein. It is usual that special applications on MIFARE memory cards MA-MD are assigned fixed sectors FS1-FS4. The applications are designated in Fig. 4 10A-40A, 10B-30B, 10C-30C, 40D, the added letter A, B, C, D designating the original memory card MA, MB, MC, MD from which the particular application 10A-40A, 10B-30B, 10C-30C, 40D was transferred to the data carrier 100. Thus, e.g. the application 30B is assigned to the sector FS3 of the memory card MB.

[0045] A reading device 200 expecting such a card MA-MD will accordingly only read out that sector FS1-FS4 of the memory card MA-MD in which it is looking for the corresponding application 10A-40A, 10B-30B, 10C-30C, 40D. If an application 10A-40A, 10B-30B, 10C-30C, 40D is stored on a card MA-MD, but in a sector GS1, GS2, GS3 different from that intended by the reading device 200, said application 10A-40A, 10B-30B, 10C-30C, 40D cannot be found by the reading device 200. For a data carrier 100 to be able to emulate a plurality of MIFARE memory cards MA-MD or at least a plurality of applications 10A-40A, 10B-30B, 10C-30C, 40D of MIFARE memory cards MA-MD that are assigned to the same fixed sector FS1-FS4, the inventive method can be used in different variants which will be described hereinafter.

[0046] The data carrier 100 comprises for this purpose a sectored memory 60 which is constructed fundamentally like a memory of a MIFARE memory card MA-MD. In each sector S1-S11 there is stored no more than one of the original MIFARE applications 10A-40A, 10B-30B, 10C-30C, 40D. In an efficient first variant, which is illustrated in Figure 4, there is not necessarily a separate identification number UID1-UID3 generated for each application 10A-40A, 10B-30B, 10C-30C, 40D. It instead suffices if those applications 10A-10C; 20A-20C; 30A-30C; 40A, 40D that were originally assigned to the same fixed sector FS1-FS4 are each given different identification numbers UID1-UID3.

[0047] The applications 10A-40A, 10B-30B, 10C-30C, 40D stored in the sectors S1-S11 of the data carrier 100 are divided up into groups G1-G3 each containing only those applications 10A-40A; 10B-30B; 10C-30C, 40D that were originally assigned to pairwise different fixed sectors FS1-FS4. Each of said groups G1-G3 is assigned its own identification number UID1-UID3, and each application 10A-40A, 10B-30B, 10C-30C, 40D within such a group G1-G3 is assigned as additional selection information the originally assigned fixed sector FS1-FS4, 10A(FS1)-40A(FS4), 10B(FS1)-30B(FS3), 10C(FS1)-30C(FS3), 40D(FS4). Said thus assigned selection information generates a virtual sector assignment corresponding to that of an emulated MIFARE memory card.

[0048] The communication device 70 now generates communication-readiness signals for said groups G1-G3 of applications 10A-40A; 10B-30B; 10C-30C, 40D, the communication-readiness signal indicating a communication readiness of each individual one of the applications 10A-40A, 10B-30B, 10C-30C, 40D. The reading device 200 can select such a group G1-G3 of applications 10A-40A; 10B-30B; 10C-30C, 40D for communication via the identification number UID1-UID3. The group in question appears to the reading device 200 to be an original MIFARE memory card MA-MD. Via the additional selection information FS1-FS4 the reading device 200 can then select from the group G1-G3 the corresponding application 10A-40A, 10B-30B, 10C-30C, 40D corresponding to that sector assignment GS1-GS3 containing the desired application. The selection information FS1-FS4 in the form of the virtual sector assignment appears to the reading device 200 to be a fixed sector assignment of an ap-

plication on an original MIFARE memory card. In this variant of the method for emulating MIFARE memory cards it is possible for the reading device 200 to access all applications 10A-10C; 20A-20C; 30A-30C; 40A, 40D stored on the data carrier 100 that were originally assigned to the same fixed sector FS1-FS4, independently of their actual sector position S1-S11 on the data carrier 100.

[0049] In a second, simpler variant (not shown), each application 10A-40A, 10B-30B, 10C-30C, 40D is assigned its own identification number UID1-UID3. In this way the data carrier 100 appears to a reading device 200 to be a multiplicity of MIFARE memory cards MA-MD that all contain only one application 10A-40A, 10B-30B, 10C-30C, 40D in each case. The information about which sector FS1-FS4 the particular application 10A-40A, 10B-30B, 10C-30C, 40D was originally assigned to can in turn be stored in the additional selection information assigned to said application 10A-40A, 10B-30B, 10C-30C, 40D.

[0050] The communication device 70 of the data carrier 100 thus generates communication-readiness signals for all applications 10A-40A, 10B-30B, 10C-30C, 40D with different identification numbers UID1-UID3 in each case. The reading device 200 can then select and execute an application 10A-40A, 10B-30B, 10C-30C, 40D via the corresponding identification number UID1-UID3, provided that the sector assignment FS1-FS4 stored in the additional selection information matches the sector assignment GS1-GS3 desired by the reading device 200. The reading device 200 can in this way separately access each of the applications 10A-40A, 10B-30B, 10C-30C, 40D stored on the data carrier 100. Different applications 10A-10C; 20A-20C; 30A-30C; 40A, 4D that were originally assigned to the same fixed sector FS1-FS4 are now all available to the reading device 200, independently of their actual sector position S1-S11 on the data carrier 100. However, it is possible that the reading device 200 selects for communication a large number of applications 10A-40A, 10B-30B, 10C-30C, 40D that do not correspond to the sector assignment GS1-GS3 desired by the reading device 200, since each application 10A-40A, 10B-30B, 10C-30C, 40D has been assigned its own identification number UID1-UID3. However, this increases the total communication effort between the reading device 200 and the applications 10A-40A, 10B-30B, 10C-

30C, 40D on the data carrier 100, so that the method described as the first variant is generally to be preferred if an efficient data interchange is desired.

[0051] In a third embodiment (not shown), an electronic device, in particular a mobile terminal, can be configured as the data carrier 100 for communication with a reading device 200. The mobile terminal comprises for this purpose a contactless interface, for example an NFC interface. For communication with the reading device 200 the mobile terminal performs the role of the passive communication partner ("slave") while the reading device 200 functions as the active communication partner ("master"). The applications 10, 20, 30 present on the data carrier 100 are each stored in separate memory areas of the data carrier 100, preferably one application 10, 20, 30 per memory area.

[0052] The memory areas are located on a plurality of secure chip cards, e.g. (U)SIM mobile communication cards, SD cards, EMV payment cards or the like, integrated in the mobile terminal. This protects the corresponding applications 10, 20, 30 and the data generated thereby from unauthorized access. The communication device 70 of the mobile terminal controls the communication of the applications 10, 20, 30 on the chip cards with the reading device 200 via the contactless interface. This permits a so-called "secure NFC" between a reading device 200 and a plurality of applications 10, 20, 30 stored securely on a data carrier 100.

Claims

1. A method for contactless communication of a reading device (200) with at least two communication-ready applications (10, 20, 30) located on a portable data carrier (100), characterized by the steps of:

   - generating a first communication-readiness signal to the reading device (200) for a first of the at least two applications (10, 20, 30), the communication-readiness signal comprising a first identification number (UID1) which is assigned to the first of the at least two applications (10, 20, 30) and indicates to the reading device (200) the communication readiness of said first application, and
   - generating a second communication-readiness signal to the reading device (200) for a second of the at least two applications (10, 20, 30), the second communication-readiness signal comprising a second identification number (UID2) different from the first identification number (UID1), which is assigned to said second application and indicates to the reading device (200) the communication readiness of said second application.

2. The method according to claim 1, characterized in that the first communication-readiness signal is generated for a first group (G1) of applications (10A-40A) comprising the first application, and the first identification number (UID1) is assigned to each of the applications (10A-40A) in the first group (G1), and the second communication-readiness signal is generated for a second group (G2) of applications (10B-30B) comprising the second application, and the second identification number (UID2) is assigned to each of the applications (10B-30B) in the second group (G2), the first communication-readiness signal indicating to the reading device (200) the communication readiness of each of the applications (10A-40A) of the first group (G1), and the second communication-readiness signal indicating to the reading device (200) the communication readiness of each of the applications (10B-30B) of the second group (G2).

3. The method according to claim 2, characterized in that each of the applications (10A-40A) of the first group (G1) and/or each of the applications (10B-30B) of the second group (G2) is assigned additional selection information in each case.

4. The method according to any of claims 1 to 3, characterized in that the reading device (200) emits search signals, the signals generated for the applications (10, 20, 30) being response signals to the search signals.

5. The method according to any of claims 1 to 4, characterized by the further step of toggling between the applications (10, 20, 30) for communication of the application (10, 20, 30) with a reading device (200).

6. The method according to claim 5, characterized in that toggling is effected by branching or by context switching.

7. The method according to any of claims 1 to 6, characterized in that the reading device (200) selects for further communication one or more of the at least two applications (10, 20, 30) via the identification numbers (UID1-UIDn) assigned to the applications (10, 20, 30).

8. The method according to claim 7 with claim 3, characterized in that the reading device (200) selects for further communication one or more of the at least two applications (10A-40A, 10B-30B, 10C-30C, 40D) via the identification numbers (UID1-UID3) assigned to the applications (10A-40A, 10B-30B, 10C-30C, 40D) and via the additional selection information assigned to the applications (10A-40A, 10B-30B, 10C-30C, 40D).

9. The method according to claim 7 or 8, characterized in that for one or more of the at least two applications (10, 20, 30) that have not yet been selected for further communication by the reading device (200), the communication-readiness signal is generated while the communication with one or more others of the at least two applications (10, 20, 30) that have been selected for further communication by the reading device (200) is not yet completed.

10. The method according to any of claims 7 to 9, characterized in that for one or more of the at least two applications (10, 20, 30) that have not yet been selected for further communication by the reading device (200), the communication-readiness signal is generated after one or more others of the at least two applica-

tions (10, 20, 30) have been suspended after completion of communication with the reading device (200).

11. The method according to any of claims 7 to 10, characterized in that the data carrier (100) informs the reading device (200) by means of collision signals that one or more of the at least two applications (10, 20,30) that have not yet been selected for further communication by the reading device (200) are present by signals being sent that simulate a collision between a plurality of applications (10, 20, 30).

12. The method according to any of claims 7 to 10, characterized in that the data carrier (100) informs the reading device (200) by means of an allocation of one or more time slots that one or more of the at least two applications (10, 20, 30) that have not yet been selected for further communication by the reading device (200) are present.

13. The method according to any of claims 7 to 12, characterized by the further step of storing information in a nonvolatile memory of the data carrier (100) about which of the at least two applications (10, 20, 30) was last selected for further communication by the reading device (200).

14. The method according to any of claims 7 to 12, characterized by the further step of storing information in a nonvolatile memory of the data carrier (100) about which of the at least two applications (10, 20, 30) has already completed active communication with the reading device (200).

15. The method according to claim 13 or 14, characterized in that upon new communication of the reading device (200) with the data carrier (100), a communication-readiness signal is emitted first for one of the at least two applications (10, 20, 30) that is different from the application (10, 20, 30) designated by the stored information.

16. The method according to claim 13 or 14, characterized in that upon new communication of the reading device (200) with the data carrier (100), a communica-

tion-readiness signal is emitted first for the application (10, 20, 30) with which active communication was effected last.

17. The method according to any of claims 7 to 16, characterized in that the reading device (200) addresses an application (10, 20, 30) selected for further communication via a dynamically allocated session number (CID1-CIDn).

18. The method according to claim 17, characterized in that upon addressing, the session number (CID1-CIDn) is linked on the data carrier (100) with the identification number (UID1-UIDn) assigned to the application (10, 20, 30).

19. The method according to claim 18 with claim 3, characterized in that upon addressing, the session number (CID1-CID3) is linked on the data carrier (100) additionally with the additional selection information assigned to the application (10A-40A, 10B-30B, 10C-30C, 40D).

20. The method according to any of claims 1 to 19, characterized in that the data carrier (100) recognizes by a response of the reading device (200) to communication-readiness signals emitted by the data carrier (100) whether the reading device (200) is set up to resolve a collision between a plurality of applications (10, 20, 30).

21. The method according to any of claims 1 to 20, characterized in that the reading device (200) communicates with a plurality of the at least two applications (10, 20, 30) in parallel.

22. The method according to any of claims 1 to 21, characterized in that the reading device (200) interprets the identification numbers (UID1-UIDn) as identification numbers of different data carriers.

23. The method according to claim 22 with claim 3, characterized in that the data carrier (100) generates the additional selection information as a virtual sector assignment (FS1-FS4) and the reading device (200) interprets the additional selection information as a sector assignment (FS1-FS4) of a memory area of one of

the different data carriers (MA-MD), whereas the different data carriers (MA-MD) may be emulated data carriers (MA-MD).

24. A contactlessly communicating portable data carrier (100), comprising at least two applications (10, 20, 30) stored thereon and a communication device (70) for controlling communication between a reading device (200) and the at least two applications (10, 20, 30), characterized in that the communication device (70) is set up to generate communication-readiness signals to the reading device (200) which in each case indicate to the reading device (200) a communication readiness for one of the applications (10, 20, 30) and comprise an identification number assigned to the corresponding communication-readiness application (10, 20, 30).

25. The data carrier (100) according to claim 24, characterized in that the communication device (70) is set up to generate communication-readiness signals to the reading device (200) which in each case indicate to the reading device a communication readiness of each application (10A-40A; 10B-30B; 10C-30C, 40D) of a group (G1; G2; G3) of applications (10A-40A; 10B-30B; 10C-30C, 40D) comprising said application and comprise an identification number (UID1; UID2; UID3) assigned to each of the applications (10A-40A, 10B-30B; 10C-30C, 40D) of the group (G1; G2; G3).

26. The data carrier according to claim 25, characterized in that the communication device (70) is set up to assign additional selection information to each of the applications (10A-40A; 10B-30B; 10C-30C, 40D) of the group (G1; G2; G3).

27. The data carrier (100) according to any of claims 24 to 26, characterized in that the communication device (70) is set up to generate the communication-readiness signals as response signals to search signals received from a reading device (200).

28. The data carrier (100) according to any of claims 24 to 27, characterized by a toggling device (50) which is set up to toggle between the applications (10, 20,

30) of the data carrier (100) for communication of the applications (10, 20, 30) with a reading device (200).

29. The data carrier (100) according to claim 28, characterized in that the toggling device (50) is set up to toggle between the applications (10, 20, 30) of the data carrier (100) by means of branching or context switching.

30. The data carrier (100) according to any of claims 24 to 29, characterized in that the communication device (70) is set up to establish the communication between a reading device (200) and an application (10, 20, 30) addressed by the reading device (200) via a session number (CID1-CIDn).

31. The data carrier (100) according to claim 30, characterized in that the communication device (70) is set up to link, upon addressing of the application (10, 20, 30), the session number (CID1-CIDn) with the identification number (UID1-UIDn) assigned to the application (10, 20, 30).

32. The data carrier (100) according to claim 31 with claim 26, characterized in that the communication device (70) is set up to link, upon addressing of the application (10A-40A, 10B-30B, 10C-30C, 40D), the session number (CID1-CID3) additionally with the additional selection information assigned to the application (10A-40A, 10B-30B, 10C-30C, 40D).

33. The data carrier (100) according to any of claims 24 to 32, characterized in that the communication device (70) is set up to determine those applications (10, 20, 30) among the at least two applications (10, 20, 30) that are ready for communication with a reading device (200).

34. The data carrier (100) according to claim 33, characterized in that the communication device (70) is set up to emit communication-readiness signals for one or more of the at least two applications (10, 20, 30) that are ready for communication with a reading device (200) and not yet communicating with a reading device (200) while the communication with one or more others of the at least two applications (10, 20, 30) is not yet completed.

35. The data carrier (100) according to claim 33 or 34, characterized in that the communication device (70) is set up to emit communication-readiness signals for one or more of the at least two applications (10, 20, 30) that are ready for communication with a reading device (200) and not yet communicating with a reading device (200) after one or more others of the at least two applications (10, 20, 30) have been suspended after completion of communication with a reading device (200).

36. The data carrier (100) according to any of claims 24 to 35, characterized in that the communication device (70) is set up to inform the reading device (200) via collision signals simulating a collision between a plurality of applications that one or more of the at least two applications (10, 20, 30) located on the data carrier (100) that have not yet been selected for further communication by the reading device (200) are present.

37. The data carrier (100) according to any of claims 24 to 36, characterized in that the communication device (70) is set up to store information in a nonvolatile memory of the data carrier (100) about which of the at least two applications (10, 20, 30) last communicated with a reading device (200).

38. The data carrier (100) according to claim 37, characterized in that the communication device (70) is set up to emit, upon new contacting of a reading device (200) with the data carrier (100), a communication-readiness signal first for one of the at least two applications (10, 20, 30) that is different from the application (10, 20, 30) designated by the stored information.

39. The data carrier (100) according to any of claims 24 to 38, characterized in that the communication device (70) is set up to recognize by a response of a reading device (200) to communication-readiness signals emitted by the communication device (70) whether the reading device (200) is set up to resolve collisions between a plurality of applications.

40. The data carrier (100) according to any of claims 24 to 39, characterized in that the data carrier (100) is configured as a contactlessly communicating chip card,

contactlessly communicating label, contactlessly communicating identification document or as a (U)SIM mobile communication card.

41. The data carrier (100) according to any of claims 24 to 40, characterized in that the data carrier (100) has a dual interface and can be operated both contactlessly and with contact.

42. The data carrier (100) according to any of claims 24 to 39, characterized in that the data carrier (100) is configured as a security module in a device comprising communication means for contactless communication, the security module having software means for communicate contactlessly via the communication means of the device.

43. The data carrier (100) according to any of claims 24 to 42, characterized by a memory (60) which is divided into sectors (S1-S11), each of the sectors (S1-S11) having no more than one of the at least two applications (10A-40A, 10B-30B, 10C-30C, 40D) stored therein in each case.

44. The data carrier (100) according to claim 43 with claim 26, characterized in that the communication device (70) is set up to assign (FS1-FS4) the at least two applications (10A-40A; 10B-30B; 10C-30C, 40D) the additional selection information in the form of a virtual sector assignment and to generate communication-readiness signals for the groups (G1; G2; G3) of applications, the groups (G1; G2; G3) in each case comprising applications (10A-40A, 10B-30B, 10C-30C, 40D) with pairwise different virtual sector assignments (FS1-FS4).

45. The data carrier (100) according to claim 43 or 44, characterized in that each of the sectors (S1-S11) is access-protected separately for access by a reading device (200) to applications (10A-40A, 10B-30B, 10C-30C, 40D) stored in said sectors.

46. The data carrier (100) according to any of claims 24 to 39, characterized in that the data carrier (100) is configured as an electronic device, in particular as a mobile terminal, with a contactless interface for communication with a reading device (200) and with a plurality of memories, each of the memories having no

more than one of the at least two applications (10, 20, 30) stored therein in each case.

47. The data carrier (100) according to claim 46, characterized in that the contactless interface is configured as an NFC interface and the data carrier (100) is set up to be operated in the passive mode for communication with a reading device (200).

48. The data carrier (100) according to claim 46 or 47, characterized in that the memories are formed on chip cards, in particular (U)SIM mobile communication cards, secure digital memory cards or EMV payment cards, integrated into the data carrier (100).

Abstract

The present invention relates to a method and an accordingly set up data carrier for contactless, in particular parallel, communication of a reading device (200) with at least two communication-ready applications (10, 20, 30) located on a portable data carrier (100). A first communication-readiness signal is generated for a first application (10, 20, 30) and sent to the reading device (200), the signal comprising a first identification number that is assigned to the first application (10, 20, 30) and indicates to the reading device (200) the communication readiness of said first application, and a second communication-readiness signal is generated and sent for a second application (10, 20, 30), the second signal comprising a second identification number different from the first identification number, which is assigned to said second application and indicates to the reading device (200) the communication readiness of said second application. The identification numbers simulate for the reading device the communication readiness of a data carrier in each case. The reading device thus has the impression of communicating with applications of two separate data carriers.

FIG 1

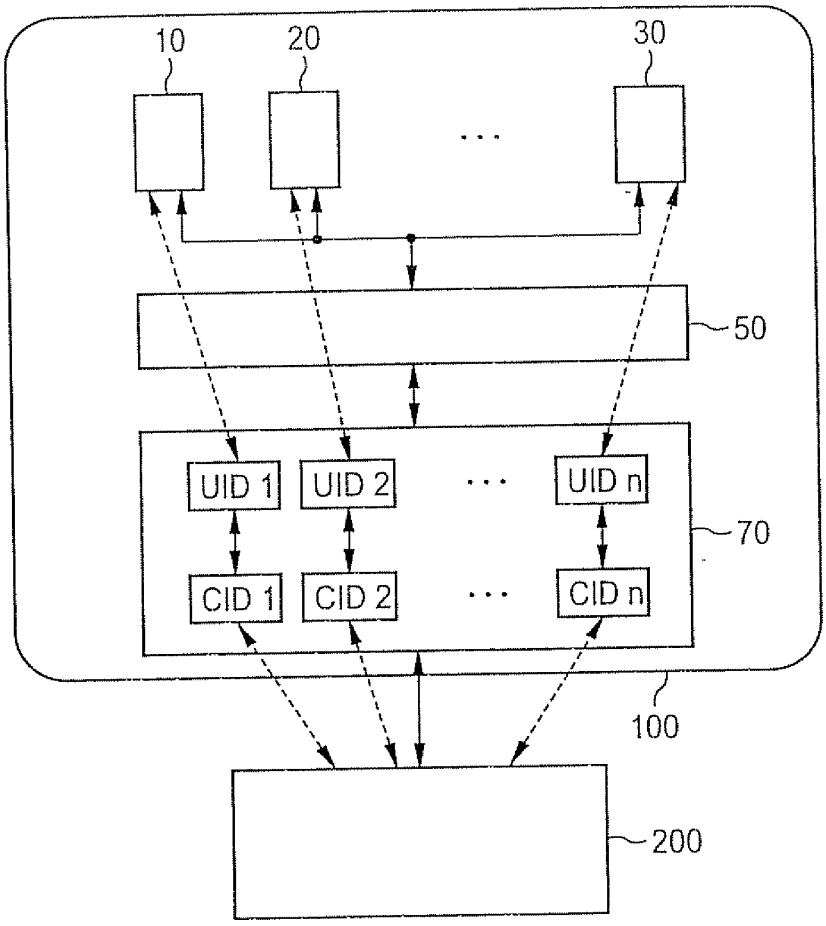

FIG 2

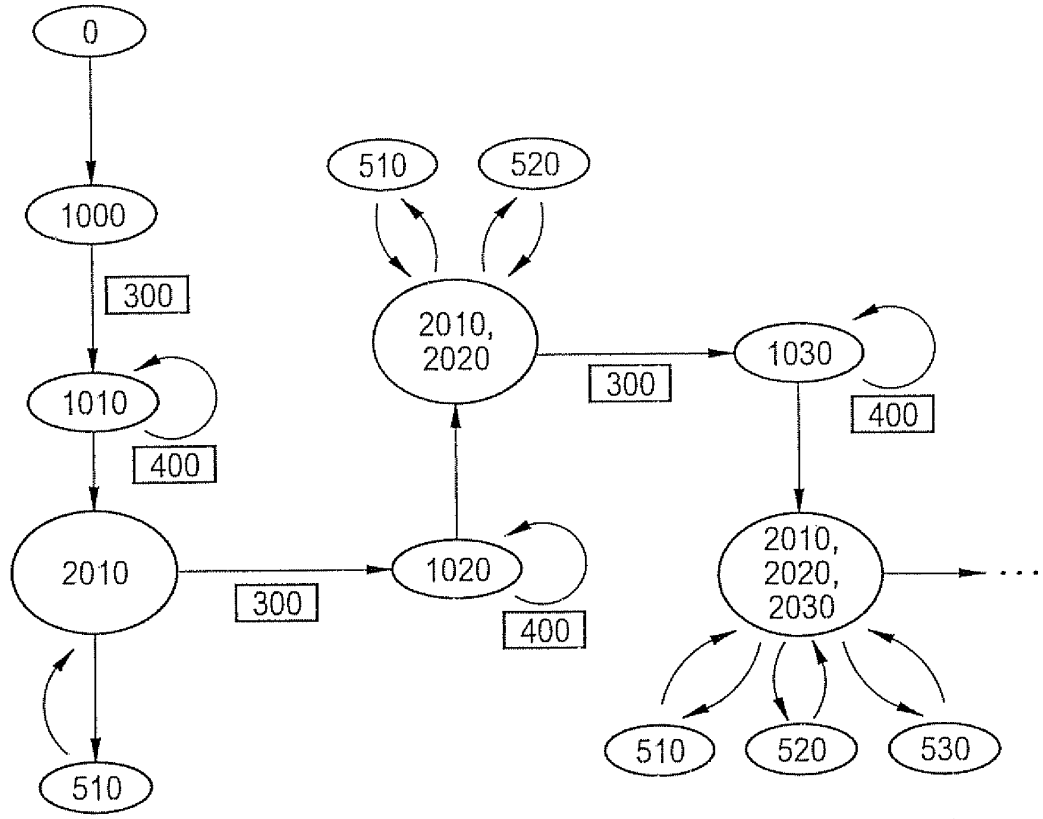
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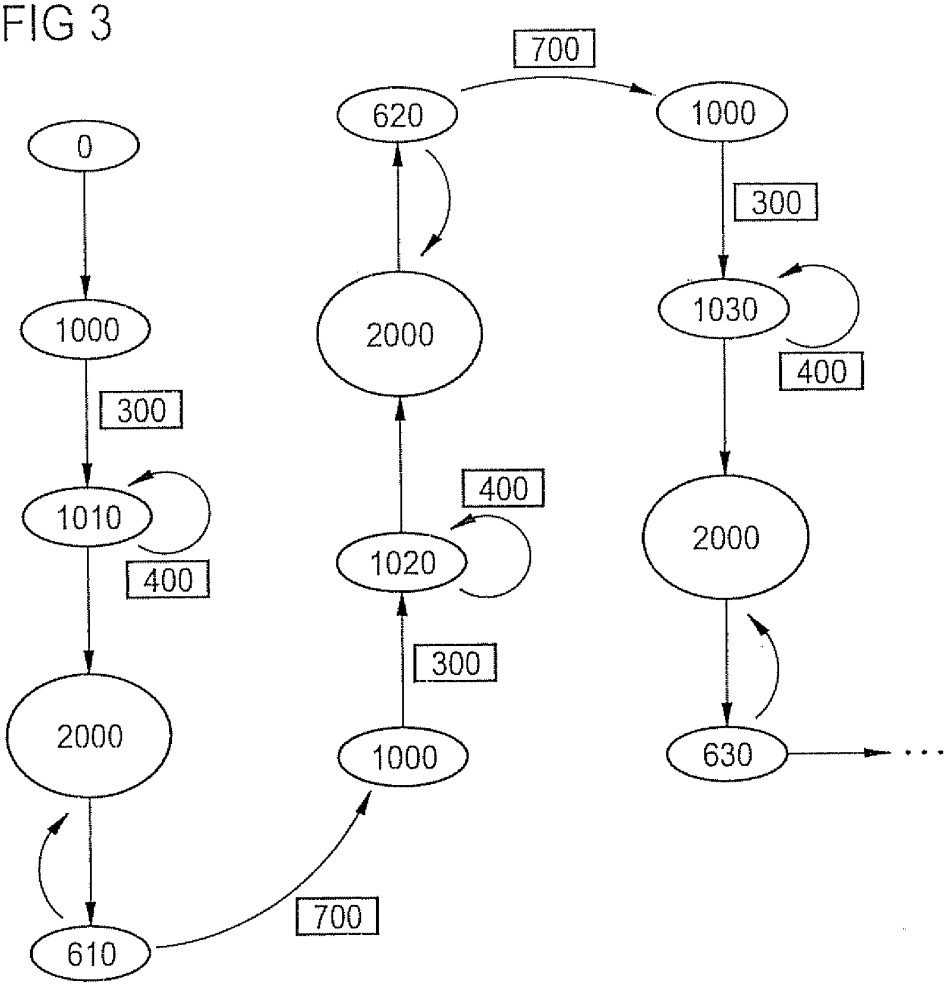
FIG 3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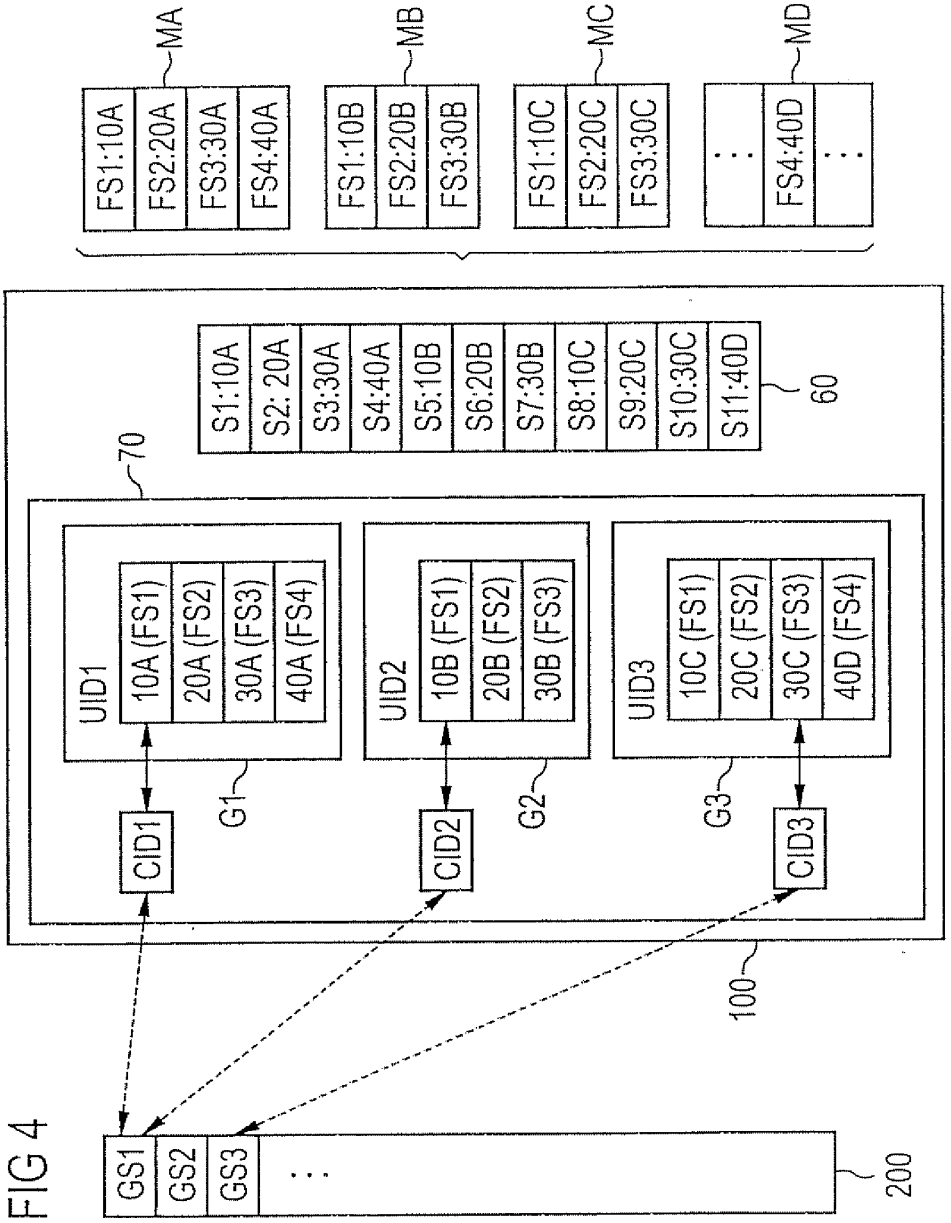
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FS2:20A
FS3:30A
FS4:40A
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FS1:10B
FS2:20B
FS3:30B
MC
FS1:10C
FS2:20C
FS3:30C
MD
FS4:40D
S1:10A
S2: 20A
S3:30A
S4:40A
S5:10B
S6:20B
S7:30B
S8:10C
S9:20C
S10:30C
S11:40D
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30A (FS3)
40A (FS4)
UID2
10B (FS1)
20B (FS2)
30B (FS3)
UID3
10C (FS1)
20C (FS2)
30C (FS3)
40D (FS4)
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G2
G3
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CID2
CID3
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GS1
GS2
GS3
200

FIG 4

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER
First Named Inventor/Applicant Name:	Klaus FINKENZELLER
Filer:	J. Ernest Kenney/Tiffany Stepney
Attorney Docket Number:	FINK3009/JEK

Filed as Large Entity

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
National Stage Fee	1631	1	330	330
Natl Stage Search Fee - Report provided	1642	1	430	430
National Stage Exam - all other cases	1633	1	220	220
Pages:				
Claims:				
Claims in excess of 20	1615	28	52	1456
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	2436

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Deposit Account	020200
Authorized User	

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1		application_121208.pdf	2048594 fdb7add35eede572d31263d8ea3abb7a18ba9402	yes	49

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal of New Application	1	3
Application Data Sheet	4	6
Preliminary Amendment	7	18
Specification	19	35
Claims	36	44
Abstract	45	45
Drawings-only black and white line drawings	46	49

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	37034 27955aff12e40cbb8a8a76813649ba066eb9def1	no	2

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Erklärungen gemäß Regel 4.17:

— *hinsichtlich der Berechtigung des Anmelders, ein Patent zu beantragen und zu erhalten (Regel 4.17 Ziffer ii)*

— *hinsichtlich der Berechtigung des Anmelders, die Priorität einer früheren Anmeldung zu beanspruchen (Regel 4.17 Ziffer iii)*

— *Erfindererklärung (Regel 4.17 Ziffer iv)*

Veröffentlicht:

— *ohne internationalen Recherchenbericht und erneut zu veröffentlichen nach Erhalt des Berichts*

[Fortsetzung auf der nächsten Seite]

(54) Title: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

(54) Bezeichnung: DATENTRÄGER UND VERFAHREN ZUR KONTAKTLOSEN KOMMUNIKATION ZWISCHEN DEM DATENTRÄGER UND EINEM LESEGERÄT

(57) Abstract: The present invention relates to a method and an appropriately customized data storage medium for contactless, particularly parallel, communication between a reader (200) and at least two applications (10, 20, 30) on a portable data storage medium (100) which are ready for communication. In this case, a first communication readiness signal is produced for a first application (10, 20, 30) and is sent to the reader (200), the signal comprising a first identification number which is associated with the first application (10, 20, 30) and indicates to the reader (200) that this first application is ready for communication, and a second communication readiness signal is produced for a second application (10, 20, 30) and is sent, the second signal comprising a second identification number which is different from the first identification number and which is associated with this second application and indicates to the reader (200) that this second application is ready for communication. The identification numbers respectively pretend to the reader that a data storage medium is ready for communication. This provides the reader with the impression that it is in communication with applications from two separate data storage media.

(57) Zusammenfassung: Die vorliegende Erfindung betrifft ein Verfahren und einen entsprechend eingerichteten Datenträger zur kontaktlosen, insbesondere parallelen, Kommunikation eines Lesegeräts (200) mit zumindest zwei auf einem tragbaren Datenträger (100) befindlichen kommunikationsbereiten Applikationen (10, 20, 30). Dabei wird ein erstes Kommunikationsbereitschaftssi gnal für eine erste Applikation (10, 20, 30) erzeugt und an das Lesegerät (200) gesendet, wobei das Signal eine erste Identifikationsnummer umfasst, die der ersten Applikation (10, 20, 30) zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und ein zweites Kommunikationsbereitschaftssignal für eine zweite Applikation (10, 20, 30) erzeugt und gesendet, wobei das zweite Signal eine von der ersten Identifikationsnummer verschiedene zweite Identifikationsnummer umfasst, die dieser zweiten Applikation zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser zweiten Applikation anzeigt. Die Identifikationsnummern täuschen dabei dem Lesegerät jeweils die Kommunikationsbereitschaft eines Datenträgers vor. Das Lesegerät hat dadurch den Eindruck, mit Applikationen von zwei separaten Datenträgern zu kommunizieren.

WO 2007/144149 A2

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

Datenträger und Verfahren zur kontaktlosen Kommunikation zwischen dem Datenträger und einem Lesegerät

Die vorliegende Erfindung betrifft ein Verfahren zur kontaktlosen Kommunikation von zumindest zwei auf einem gemeinsamen tragbaren Datenträger gespeicherten Applikationen mit einem Lesegerät und einen entsprechend eingerichteten Datenträger. Ein Datenträger im Sinne der Erfindung kann z.B. eine kontaktlos kommunizierende Chipkarte, ein kontaktlos kommunizierendes Label, ein kontaktlos kommunizierendes Ausweisdokument, ein zur kontaktlosen Kommunikation ausgestattetes Sicherheitsmodul SAM (secure application module) oder ein zur kontaktlosen Kommunikation ausgestattetes elektronisches Gerät, wie z.B. ein Mobilfunkendgerät mit einer NFC-Schnittstelle, sein.

Im Stand der Technik (z.B. Finkenzeller, Klaus: RFID-Handbuch, München, 2002) werden verschiedene kontaktlos kommunizierende Datenträger beschrieben, beispielsweise Chipkarten und RFID-Transponder (radio frequency identification transponder), z.B. nach dem Standard ISO/IEC 14443. Dabei handelt es sich um so genannte Proximity-Coupling-Chipkarten, die häufig im Anwendungsbereich "Ticketing" Verwendung finden, also beispielsweise als Fahrausweis im öffentlichen Nahverkehr. Die Energieversorgung des Datenträgers erfolgt dabei üblicherweise durch das magnetische Wechselfeld eines Lesegerätes. Die Reichweite eines solchen Datenträgers beträgt ca. 7 bis 15 cm. Die Erfindung ist aber nicht auf Transponder-Chipkarten mit diesen kurzen Reichweiten beschränkt, sondern kann auch im Zusammenhang mit anderen kontaktlos kommunizierenden Datenträgern mit anderen Reichwei-

ten und / oder nach anderen Standards Verwendung finden. Prinzipiell sind auch Datenträger mit eigener Energiequelle einsetzbar.

Wird ein solcher Datenträger in das Ansprechfeld eines Lesegerätes gebracht, wodurch seine Energieversorgung einsetzt und er in einen betriebsbereiten Modus versetzt wird, kann er ein vom Lesegerät zyklisch ausgesendetes Suchsignal empfangen und mittels eines ersten Antwortsignals dem Lesegerät seine Kommunikationsbereitschaft anzeigen. Sobald das Lesegerät dieses Signal empfangen hat, startet es einen Selektionsprozess mit Hilfe eines so genannten Antikollisionsverfahrens, um gezielt einen Datenträger zur weiteren Kommunikation auszuwählen, auch wenn sich gleichzeitig eine Mehrzahl von kommunikationsbereiten Datenträgern im Ansprechfeld des Lesegeräts befinden. Es gibt jedoch auch Lesegeräte, die über proprietäre, nicht standardisierte Kommunikationsprotokolle kommunizieren und keine Antikollisionsverfahren unterstützen.

Die Auswahl eines Datenträgers erfolgt bei einem Antikollisionsverfahren anhand einer eindeutigen Identifikationsnummer des Datenträgers, beispielsweise eines UID (unique identifier), eines PUPI (pseudo-unique PICC identifier, PICC=proximity ICC, ICC=integrated circuit card) oder dergleichen. Für Datenträger gemäß ISO/IEC 14443 gilt weiterhin, dass ein zur Kommunikation ausgewählter Datenträger während der Kommunikation über eine vom Lesegerät dynamisch vergebene eindeutige Sitzungsnummer (Session-ID, CID) adressierbar ist. In diesem Zustand antwortet ein solcher Datenträger nicht mehr auf die vorerwähnten und weiterhin vom Lesegerät ausgesendeten Suchsignale. Auf diese Weise kann das Lesegerät weitere im Ansprechfeld befindliche Datenträger über ihre eindeutige Identifikationsnummer selektieren und auch diesen wiederum eindeutige Sitzungsnummern zuordnen. Nach ISO/IEC 14443 können bis zu 16 Datenträger auf diese

Weise gleichzeitig zur Kommunikation ausgewählt und über dementsprechend 16 unterschiedliche Sitzungsnummern adressiert werden. Ein vom Lesegerät ausgesendetes und mittels der Sitzungsnummer adressiertes Kommando wird dann stets nur von dem Datenträger verarbeitet, dem diese Sitzungsnummer zugeordnet worden ist.

Weiterhin ist bekannt, dass sich auf einem tragbaren Datenträger mehrere Applikationen gleichzeitig befinden können und dass die dazugehörigen Applikationsprozesse nebenläufig ausgeführt werden können, wenn auf dem Datenträger ein Betriebssystem eingerichtet ist, das die dazu notwendigen Mechanismen zur Verfügung stellt. Nebenläufiges Ausführen von Prozessen bedeutet, dass diese quasi gleichzeitig ausgeführt werden, indem immer wieder zwischen verschiedenen Prozessen umgeschaltet wird. Ein Umschalten zwischen verschiedenen Prozessen bedeutet, dass diese Prozesse abwechselnd dem Prozessor zugeführt werden, um tatsächliche Rechenzeit zu erhalten. Ein Applikationsprozess bezeichnet eine sich in Ausführung befindliche Applikation. Im Rahmen dieser Erfindung werden im Folgenden sowohl eine Applikation als auch der ihr zugehörige Applikationsprozess stets als Applikation bezeichnet.

Es ist möglich, eine Mehrzahl von verschiedenen nebenläufigen Applikationen, beispielsweise über ihre Applikationsbezeichner AID (application identifier), über verschiedene logische Kanäle (logical channels) anzusprechen. Logische Kanäle machen es möglich, über eine einzige Schnittstelle parallel mehrere virtuelle Kanäle vorzugeben, indem die entsprechenden Kommunikationsprotokolle so ausgelegt sind, dass der adressierte logische Kanal mitkodiert wird. Auf diese Weise können somit parallel mehrere Applikationen auf dem Datenträger durch Angabe des jeweils zu benutzenden Kanals über den Applikationsbezeichner angesprochen werden.

Die heute gängigen Protokolle und die Kodierung der zu übertragenden Daten (APDU, application data unit, eine Datenübertragungsform, die auf einem Anweisung/Antwort-Schema basiert) erlauben bis zu vier logische Kanäle, die mittels zwei spezieller Bits kodiert sind. Jedoch enthalten die auf ein von außerhalb des Datenträgers erhaltenes Kommando erzeugten Antworten des Datenträgers keine Angaben mehr über den logischen Kanal. Dies hat zur Folge, dass externe Anwendungen, die mit einer Mehrzahl von nebenläufigen Applikationen auf einem Datenträger kommunizieren wollen, untereinander synchronisiert sein müssen, da eine externe Anwendung anhand der Antwort einer Applikation des Datenträgers nicht entscheiden kann, ob diese die von ihr erwartete Antwort ist oder für eine andere externe Anwendung bestimmt ist.

Die Verwaltung von logischen Kanälen ist für ein Betriebssystem des Datenträgers sehr aufwendig und benötigt eine große Menge an Speicher, umso mehr noch, wenn die Kommunikation unter gesicherten Bedingungen stattzufinden hat, also die zu einer Applikation gehörenden Daten verschlüsselt übertragen werden und allgemein gegen Ausspähen durch andere Applikationen geschützt werden.

Probleme treten auch in den Fällen auf, in denen mehrere, möglicherweise proprietäre Applikationen, die bisher jeweils als einzige Applikation auf einem eigenen Datenträger gespeichert waren, nun auf einem gemeinsamen, als Multiapplikationsdatenträger ausgebildeten Datenträger integriert werden sollen. Zu den oben erläuterten Schwierigkeiten in der parallelen Kommunikation kommt hinzu, dass Kollisionen in den Datenstrukturen stattfinden können, weil die verschiedenen Applikationen beispielsweise bisher verschiedene Inhalte auf verschiedenen Datenträgern mit identischen Dateibe-

zeichnern FID (file identifier) bezeichnet haben, die nun auf dem gemeinsamen Datenträger nur noch eine Datei bezeichnen. Es kommt auch vor, dass Applikationen von verschiedenen Datenträgern zu integrieren sind, die verschiedenen Einschränkungen in den Kommunikationsparametern, wie beispielsweise der Blocklänge übertragbarer Blöcke, unterliegen.

Aufgabe der vorliegenden Erfindung ist es, ein Verfahren anzugeben, das die kontaktlose Kommunikation von einer Mehrzahl nicht aufeinander abgestimmter Applikationen eines tragbaren Datenträgers mit einem Lesegerät ermöglicht, sowie einen entsprechend eingerichteten Datenträger.

Diese Aufgabe wird durch ein Verfahren und einen Datenträger mit den Merkmalen der unabhängigen Ansprüche gelöst. In davon abhängigen Ansprüchen sind vorteilhafte Ausgestaltungen und Weiterbildungen angegeben.

Das vorliegende erfindungsgemäße Verfahren basiert auf dem Grundgedanken, dass für zumindest zwei auf einem tragbaren, kontaktlos kommunizierenden Datenträger befindliche Applikationen, die bereit sind, mit einem Lesegerät zu kommunizieren, ein erstes Kommunikationsbereitschaftssignal an das Lesegerät für eine erste der zumindest zwei Applikationen erzeugt wird, wobei das Signal eine erste Identifikationsnummer umfasst, die der ersten der zumindest zwei Applikationen zugeordnet ist und dem Lesegerät die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und ein zweites Kommunikationsbereitschaftssignal an das Lesegerät für eine zweite der zumindest zwei Applikationen erzeugt wird, wobei das zweite Signal eine von der ersten Identifikationsnummer verschiedene zweite Identifikationsnummer umfasst, die der zweiten Applikationen zugeordnet ist und dem Lesegerät die Kommunikationsbereitschaft dieser zweiten Applikation an-

zeigt. Diese Schritte werden von einer entsprechend eingerichteten Kommunikationseinrichtung auf dem Datenträger durchgeführt.

Die Identifikationsnummern übernehmen die Rolle, die im Stand der Technik der dem Datenträger zugeordneten Identifikationsnummer (UID, PUPI und dergleichen) zukommt. Somit kann das Lesegerät eine Applikation aus einer Mehrzahl von auf einem Datenträger befindlichen Applikationen gezielt und unabhängig vom Datenträger über die Identifikationsnummer ansprechen. Ein übliches Lesegerät hat dabei den Eindruck, mit unterschiedlichen Datenträgern zu kommunizieren.

In diesem Zusammenhang ist es auch möglich, dass die Kommunikationsbereitschaftssignale jeweils für Gruppen von Applikationen erzeugt werden und dem Lesegerät die Kommunikationsbereitschaft jeder der entsprechenden Applikationen der jeweiligen Gruppe anzeigen. Dabei wird allen Applikationen in einer solchen Gruppe dieselbe Identifikationsnummer zugeordnet. Es ist möglich, jeder der Applikationen in einer Gruppe eine zusätzliche Auswahlinformation zuzuordnen, mittels welcher eine Unterscheidung der Applikationen innerhalb einer Gruppe ermöglicht wird. Auf diese Weise können die Applikationen in hierarchischer Weise gegliedert werden.

Wenn im Folgenden von der Kommunikation einer Applikation mit einem Lesegerät gesprochen wird, bedeutet dies immer die über eine Kommunikationseinrichtung des Datenträgers verlaufende Kommunikation, wobei das Lesegerät gezielt diese Applikation anspricht und die an die Applikation gerichteten Daten über die Kommunikationseinrichtung des Datenträgers an diese Applikation weitergeleitet werden. Dies gilt insbesondere auch dann, wenn sich auf dem Datenträger noch weitere kommunikationsbereite Applikationen befinden, oder Applikationen, die bereits mit dem Lesegerät in

Kommunikation stehen oder bereits durch das Lesegerät nach abgeschlossener Kommunikation suspendiert worden sind.

Die für die Applikationen erzeugten Signale des Datenträgers können z.B. periodisch ausgesendete Signale sein oder spezielle Antwortsignale auf vom Lesegerät ausgesendete Suchsignale. So kann das Lesegerät erkennen, welche kommunikationsbereiten Applikationen sich in seinem Ansprechfeld befinden, auch wenn diese auf einem gemeinsamen Datenträger gespeichert sind.

Eine vorhandene Umschaltfunktionalität des Datenträgers kann zwischen verschiedenen nebenläufig auf dem Datenträger ausgeführten Applikationen umschalten. Auf diese Weise können sich mehrere Applikationen quasi gleichzeitig mit dem Lesegerät in Kommunikation befinden, wobei das Umschalten zwischen diesen Applikationen deren parallele Kommunikation mit dem Lesegerät über die Kommunikationseinrichtung ermöglicht. Allerdings kann die Kommunikation, angepasst an die Fähigkeiten des Lesegeräts, anstatt parallel auch nacheinander stattfinden.

Die vorerwähnten Einschränkungen im Zusammenhang mit der Benutzung logischer Kanäle fallen weg. Es können mehr als vier Applikationen parallel mit dem Lesegerät kommunizieren. Die Kommunikationseinrichtung stellt sicher, dass alle Daten, die vom Lesegerät zum Datenträger gesendet werden, nur durch die angesprochene Applikation verarbeitet werden. Sie stellt insbesondere sicher, dass alle vom Datenträger zum Lesegerät ausgesendeten Daten so beschaffen sind, dass das Lesegerät sie eindeutig einer Applikation zuordnen kann.

Schließlich ergibt sich der Vorteil, dass eine Mehrzahl von Applikationen unabhängig voneinander und ohne aufeinander abgestimmt sein zu müssen, auf einem gemeinsamen Datenträger integriert werden können, da das Umschalten zwischen den Applikationen es erlaubt, dass jede der Applikationen über eigene Datenstrukturen, beispielsweise ein Dateisystem, und eigene Softwaremittel, wie beispielsweise nur von ihr genutzten Programmcode, verfügen kann. Kollisionen mit weiteren Applikationen bezüglich dieser Ressourcen sind somit ausgeschlossen.

Die Umschaltfunktionalität kann als Bestandteil des Betriebssystems ausgebildet sein. Die Umschaltung zwischen verschiedenen Applikationen kann z.B. durch Verzweigen erfolgen. Beim Verzweigen wird von einem so genannten Elternprozess, ein neuer Prozess, der Kindprozess, gestartet. Hierbei nutzen beide, Eltern- und Kindprozess, dieselben Systemressourcen, wie beispielsweise Arbeitsspeicher. Eine Umschaltung kann andererseits z.B. auch durch einen Kontextwechsel mittels eines Dispatchers erfolgen. Dabei erhält der jeweils aktuell dem Prozessor zugeordnete Prozess seinen eigenen Kontext, der beispielsweise Bereiche im Hauptspeicher und Systemvariablen umfasst.

Das Lesegerät wählt eine Applikation für die weitere Kommunikation mittels der der Applikation zugeordneten Identifikationsnummer aus. Auch die der Applikation gegebenenfalls zugeordnete zusätzliche Auswahlinformation kann von dem Lesegerät zur Auswahl herangezogen werden. Einer für die weitere Kommunikation ausgewählten Applikation wird dann vom Lesegerät dynamisch eine Sitzungsnummer zugeordnet. Über diese Sitzungsnummer kann die Applikation während der Kommunikation mit dem Lesegerät eindeutig adressiert werden. Beim Adressieren wird die Sitzungsnummer im Datenträger durch die Kommunikationseinrichtung mit der der

Applikation zugeordneten Identifikationsnummer und gegebenenfalls der zusätzlichen Auswahlinformation so verknüpft, dass bei der Kommunikation immer die richtige Applikation angesprochen wird. Ist eine Applikation vom Lesegerät zur weiteren Kommunikation ausgewählt, so findet diese Kommunikation anschließend auch statt, ohne dass es weiterer Schritte bedarf. Eine vom Lesegerät zur weiteren Kommunikation ausgewählte Applikation befindet sich also dann in Kommunikation mit dem Lesegerät.

Verfahrensgemäß werden von dem Datenträger für eine oder mehrere auf dem Datenträger befindliche Applikationen, die vom Lesegerät noch nicht für die weitere Kommunikation ausgewählt worden sind, Kommunikationsbereitschaftssignale erzeugt, auch wenn bereits eine oder mehrere andere Applikationen vom Lesegerät für die weitere Kommunikation ausgewählt worden sind und die Kommunikation mit diesen anderen Applikationen noch nicht abgeschlossen ist. Dies ist vorzugsweise auch dann der Fall, nachdem bereits eine oder mehrere andere Applikationen vom Lesegerät nach abgeschlossener Kommunikation suspendiert worden sind. Eine weitere, von der Kommunikation mit dem Lesegerät losgelöste Aktivität der vom Lesegerät suspendierten Applikation auf dem Datenträger ist weiterhin möglich.

Während nach dem Stand der Technik ein in Kommunikation befindlicher Datenträger nicht auf Suchsignale antwortet und ein suspendierter Datenträger entweder erst aus dem Ansprechfeld des Lesegeräts entfernt werden muss, um durch erneutes Einbringen wieder kommunikationsbereit zu werden oder durch ein RESET-Signal des Lesegerätes zurückgesetzt wird, kann ein Lesegerät mit allen kommunikationsbereiten Applikationen des erfindungsgemäßen Datenträgers jederzeit Kontakt aufnehmen.

Die Kommunikationseinrichtung steuert die gesamte Kommunikation zwischen den Applikationen und dem Lesegerät und kennt stets den Kommunikationsstatus jeder Applikation: kommunikationsbereit oder zur weiteren Kommunikation vom Lesegerät ausgewählt und somit mit dem Lesegerät in Kommunikation oder vom Lesegerät nach abgeschlossener Kommunikation suspendiert.

Der Datenträger teilt dem Lesegerät vorzugsweise mittels Kollisionssignalen mit, dass noch kommunikationsbereite Applikationen, die noch nicht für eine weitere Kommunikation ausgewählt worden sind, im Ansprechfeld vorhanden sind. Diese Signale, die während der Ausführung des Kollisionsalgorithmus ausgesendet werden, können beispielsweise die Form von vorgetäuschten Kollisionen zwischen einer Mehrzahl von Applikationen annehmen. Das Lesegerät wird dann parallel zur Kommunikation mit anderen Applikationen und / oder nach Kommunikationsende Suchsignale aussenden, um mit den noch nicht zur Kommunikation ausgewählten Applikationen Kontakt aufzunehmen.

Vorzugsweise kann die Kommunikationseinrichtung des Datenträgers anhand der Antworten des Lesegeräts auf ausgesendete Kommunikationsbereitschaftssignale erkennen, ob das Lesegerät in der Lage ist, eine Kollision zwischen einer Mehrzahl von Applikationen aufzulösen. In diesem Zusammenhang kann auch ein Abbrechen der Kommunikation durch das Lesegerät in dem Fall, in dem sich mehr als ein Datenträger im Ansprechfeld des Lesegeräts befindet, als eine Antwort des Lesegeräts interpretiert werden. Erkennt der Datenträger beispielsweise, dass das Lesegerät immer nur eine Applikation in seinem Ansprechfeld bearbeiten kann, kann das Aussenden von weiteren Kommunikationsbereitschaftssignalen daran angepasst werden. Der Datenträger sendet danach ein Kommunikationsbereitschaftssignal

für eine Applikation erst dann aus, wenn das Lesegerät die Kommunikation mit einer anderen Applikation abgeschlossen hat.

Vorzugsweise speichert das Verfahren mittels der Kommunikationseinrichtung in einem nichtflüchtigen Speicher Information darüber, welche der Applikationen zuletzt vom Lesegerät für die weitere Kommunikation ausgewählt worden ist. Damit kann bei erneuter Aktivierung des Datenträgers, beispielsweise nach einer Unterbrechung der Energiezufuhr, festgestellt werden, welche Applikation zuletzt mit dem Lesegerät kommuniziert hat, um dann zunächst für eine davon verschiedene Applikation ein Kommunikationsbereitschaftssignal zu erzeugen, um z.B. zu verhindern, dass immer dieselbe Applikation zuerst zum Zuge kommt und andere Applikationen möglicherweise lange Wartezeiten in Kauf nehmen müssen oder gar nicht erst zur Ausführung kommen.

Das Verfahren kann daher so gestaltet werden, dass das Lesegerät mit mehreren Applikationen parallel kommunizieren kann. Dabei werden die den Applikationen zugeordneten Identifikationsnummern vorzugsweise so gewählt, dass das Lesegerät sie wie Identifikationsnummern von unterschiedlichen Datenträgern interpretiert. Dann kann das erfindungsgemäße Verfahren problemlos mit Lesegeräten nach dem Stand der Technik durchgeführt werden.

Bei Lesegeräten, die MIFARE-Speicherkarten mit in Sektoren organisierten Speichern und Applikationen, die jeweils einem der Sektoren fest zugeordnet sind, zur Kommunikation erwarten, ist es möglich, die zusätzliche Auswahlinformation als Sektorinformation zu benutzen. Durch Verwendung der Sektorinformation wird eine virtuelle Sektorzuordnung der einzelnen Applikationen erzeugt, die derjenigen einer MIFARE-Speicherkarte entspricht. Auf

diese Weise ist es möglich, mittels eines modernen Datenträgers eine MIFARE-Speicherkarte zu emulieren, indem ein Speicher des Datenträgers mittels der Sektorinformation gegenüber dem Lesegerät als sektorierter Speicher erscheint. Für das Lesegerät ist es vorzugsweise nicht erkennbar, ob eine echte MIFARE-Speicherkarte physikalisch vorliegt, oder ob es sich um eine erfindungsgemäße emulierte MIFARE-Speicherkarte handelt.

In jedem Sektor einer derartigen emulierten MIFARE-Karte wird genau eine Applikation gespeichert. Vorzugsweise ist jeder einzelne Sektor für ein darauf zugreifendes Lesegerät separat zugriffsgeschützt, gewöhnlich durch ein dem Sektor zugeordnetes Paar von Schlüsseln. Es können somit auch solche Applikationen auf einem Datenträger ausführbar gespeichert werden, die auf unterschiedlichen ursprünglichen MIFARE-Speicherkarten jeweils entsprechenden festen Sektoren zugeordnet waren. Vorzugsweise werden dann solche Applikationen zu Gruppen mit einer gemeinsamen Identifikationsnummer zusammengefasst, die ursprünglich unterschiedlichen festen Sektoren zugeordnet waren. Dementsprechend interpretiert das Lesegerät einen derart ausgebildeten Datenträger als eine Vielzahl von MIFARE-Speicherkarten, wobei jede dieser MIFARE-Speicherkarten genau eine Gruppe von Applikationen umfasst, die in paarweise verschiedenen Sektoren residieren. Auf diese Weise kann das Lesegerät über die Identifikationsnummer erst eine Gruppe von Applikationen auswählen, die z.B. den Applikationen einer einzigen ursprünglichen MIFARE-Speicherkarte entsprechen. Danach kann anhand der zusätzlichen Auswahlinformation in der Form der virtuellen Sektorzuordnung eine spezielle Applikation ausgewählt werden, die z.B. ursprünglich fest dem Sektor 1 zugeordnet war.

Der erfindungsgemäße Datenträger kann allgemein als kontaktlos kommunizierende Chipkarte, kontaktlos kommunizierendes Label oder kontaktlos

kommunizierendes Ausweisdokument ausgebildet sein. Weiterhin ist es möglich, dass der Datenträger als Sicherheitsmodul SAM (secure application module) in einem Gerät, das zur kontaktlosen Datenübertragung eingerichtet ist, ausgebildet ist, wobei das Sicherheitsmodul über Softwaremittel verfügt, um mittels einer geeigneten Schnittstelle mit Hilfe des Geräts kontaktlos zu kommunizieren. Ein SAM ist ein sowohl mechanisch als auch softwaretechnisch abgesichertes Bauteil, das zur Aufbewahrung von geheimen Daten und zum Ausführen von Kryptoalgorithmen dient.

Weiterhin kann auch ein elektronisches Gerät, insbesondere ein Mobilfunkendgerät, mit einer Kontaktlosschnittstelle zur Kommunikation mit einem Lesegerät und mit einer Mehrzahl von zugriffsgeschützten Speicherbereichen auf unterschiedlichen Speichermedien des Geräts als erfindungsgemäßer Datenträger ausgestaltet sein. Dabei ist in jedem der Speicherbereiche eine Applikation gespeichert. Vorzugsweise sind die Speicherbereiche auf einer oder mehreren Speichermedien, insbesondere sicheren Chipkarten, ausgebildet, die in das Mobilfunkendgerät integriert sind. Dies können beispielsweise (U)SIM-Mobilfunkkarten, SD-Karten (sichere digitale Speicherkarten) oder EMV-Zahlungskarten sein. EMV bezeichnet dabei eine Spezifikation für Zahlungskarten und ist aus "Europay", "MasterCard" und "Visa" abgeleitet. Mittels des erfindungsgemäßen Verfahrens ist es dann möglich, dass das Lesegerät mit jeder der Applikationen auf den unterschiedlichen sicheren Chipkarten über die Kontaktlosschnittstelle des Mobilfunkendgeräts kommuniziert. Hierbei ist die Kontaktlosschnittstelle vorzugsweise als NFC-Schnittstelle ("Near Field Communication") ausgebildet. Auf diese Weise wird ein so genanntes "Secure-NFC" mit einem Gerät in der Rolle eines passiven Kommunikationspartners und mit mehreren darauf gespeicherten Applikationen möglich.

Nachfolgend wird die Erfindung anhand der begleitenden Zeichnungen beispielhaft erläutert. Darin zeigen:

Figur 1 eine schematische Darstellung einer ersten Ausführungsform eines erfindungsgemäßen Datenträgers;

Figur 2 ein Flussdiagramm eines Ablaufs einer ersten Ausführungsform des erfindungsgemäßen Verfahrens;

Figur 3 ein Flussdiagramm eines Ablaufs einer zweiten Ausführungsform des erfindungsgemäßen Verfahrens; und

Figur 4 eine schematische Darstellung einer zweiten Ausführungsform eines erfindungsgemäßen Datenträgers.

Verschiedene Ausführungsformen der Erfindung werden im Folgenden genauer dargestellt. Figur 1 zeigt schematisch eine erste Ausführungsform eines erfindungsgemäßen Datenträgers 100 und ein Lesegerät 200. Auf dem Datenträger 100 befinden sich zumindest zwei Applikationen 10, 20, 30. Der Datenträger 100 umfasst eine Kommunikationseinrichtung 70 und eine Umschalteinrichtung 50, die eingerichtet ist, zwischen den verschiedenen Applikationen 10, 20, 30 umzuschalten. Jeder der Applikationen 10, 20, 30 ist eine Identifikationsnummer UID1, UID2, UIDn zugeordnet. Die Identifikationsnummern UID1, UID2, UIDn werden von der Kommunikationseinrichtung 70 verwaltet. Tritt das Lesegerät 200 in Kommunikation mit einer oder mehreren der Applikationen 10, 20, 30 des Datenträgers 100, so kann das Lesegerät diese über die Identifikationsnummern UID1, UID2, UIDn zur weiteren Kommunikation auswählen und mittels von ihm dynamisch vergebenen Sitzungsnummern CID1, CID2, CIDn im weiteren Verlauf der Kommunikation

adressieren. Diese Sitzungsnummern CID1, CID2, CIDn können von der Kommunikationseinrichtung 70 mit den Identifikationsnummern der jeweils adressierten Applikationen verknüpft werden. Jegliche Kommunikation zwischen den Applikationen 10, 20, 30 des Datenträgers 100 mit dem Lesegerät 200 verläuft über die Kommunikationseinrichtung 70, wobei zwischen den Applikationen 10, 20, 30 mittels der Umschalteinrichtung 50 umgeschaltet werden kann.

Figur 2 zeigt ein Flussdiagramm eines Ablaufs einer ersten Ausführungsform des erfindungsgemäßen Verfahrens. Die Ziffern bezeichnen einzelne Verfahrensschritte und Zustände einzelner Komponenten. Gelangt der erfindungsgemäße Datenträger 100, der sich zu Beginn in nicht betriebsbereitem Zustand befindet 0, in das Ansprechfeld eines Lesegerätes 200, wird er betriebsbereit 1000 und empfängt vom Lesegerät 200 ein Suchsignal 300. Die Kommunikationseinrichtung 70 des Datenträgers 100 erzeugt für eine erste Applikation 10 ein Kommunikationsbereitschaftssignal, das die der Applikation 10 zugeordnete Identifikationsnummer UID1 umfasst 1010. Dieses Signal wird vom Datenträger ausgesendet, und die Applikation 10 wird im Laufe des Selektionsprozesses 400 mittels eines Antikollisionsverfahrens vom Lesegerät 200 für die weitere Kommunikation ausgewählt.

Während oder bevor das Lesegerät 200 mit der Applikation 10 des Datenträgers 100 kommuniziert 2010, welche sie über die Sitzungsnummer CID1 adressiert 510, sendet es weitere Suchsignale 300 aus und die Kommunikationseinrichtung 70 des Datenträgers 100 erzeugt für eine zweite Applikation 20 ein die Identifikationsnummer UID2 umfassendes Kommunikationsbereitschaftssignal 1020 und die Applikation 20 wird im Laufe des Selektionsprozesses 400 vom Lesegerät 200 für die weitere Kommunikation ausgewählt. Das Lesegerät 200 befindet sich nun parallel in Kommunikation mit den bei-

den Applikationen 10 und 20, 2010, 2020, die über die Sitzungsnummern CID1 510 bzw. CID2 adressiert werden 520.

Analog folgt die Kommunikationsaufnahme des Lesegeräts 200 mit der Applikation 30 durch ein Suchsignal 300, ein von der Kommunikationseinrichtung 70 erzeugtes Kommunikationsbereitschaftssignal 1030, einen Selektionsschritt 400, womit schließlich das Lesegerät 200 mit den drei über die Sitzungsnummern CID1, CID2, CIDn adressierten Applikationen 10, 20, 30, 510, 520, 530 parallel in Kommunikation ist 2010, 2020, 2030. Wie angedeutet, kann sich das Verfahren in gleicher Weise noch mit weiteren Applikationen fortsetzen.

Für das Lesegerät 200 erscheinen die verschiedenen Applikationen des erfindungsgemäßen Datenträgers 100 als eine Ansammlung verschiedener Datenträger nach dem Stand der Technik.

Figur 3 zeigt ein Flussdiagramm eines Ablaufs einer zweiten Ausführungsform des erfindungsgemäßen Verfahrens. Die Ziffern bezeichnen wie in Figur 2 einzelne Verfahrensschritte und Zustände einzelner Komponenten. Hauptunterschied zu der in Figur 2 dargestellten Ausführungsform ist, dass im gegenwärtigen Beispiel das Lesegerät nicht mit mehreren Applikationen mittels verschiedene Sitzungsnummern gleichzeitig kommuniziert, sondern mit verschiedenen Applikationen nacheinander.

Schritte und Zustände, die gleich sind zu denen in Figur 2, werden gleich bezeichnet und nicht erneut erklärt. Nach Aussenden eines Suchsignals 300 durch das Lesegerät 200 erzeugt die Kommunikationseinrichtung 70 des Datenträgers 100 für eine erste Applikation 10 ein Kommunikationsbereitschaftssignal, das die der Applikation zugeordnete Identifikationsnummer

UID1 1010 umfasst und die Applikation 10 wird im Laufe des Selektionsprozesses 400 mittels eines Antikollisionsverfahrens vom Lesegerät 200 für die weitere Kommunikation ausgewählt. Das Lesegerät 200 befindet sich in Kommunikation 2000 mit der Applikation 10, 610, und schließt diese Kommunikation auch ab, bevor es neue Suchsignale aussendet. Davor muss die Applikation 10 suspendiert werden 700, beispielsweise mittels eines DESELCT-Kommandos, wobei der erfindungsgemäße Datenträger weiterhin betriebsbereit 1000 bleibt, und damit auf das nächste Suchsignal 300 des Lesegeräts 200 mit einem für eine zweite Applikation 20 erzeugten Kommunikationsbereitschaftssignal, welches die der Applikation 20 zugeordnete Identifikationsnummer UID2 umfasst, antworten kann. Ein analoger Prozess kann sich nun sequentiell für alle auf dem Datenträger befindlichen Applikationen anschließen. In Figur 3 ist noch die Kommunikation des Lesegerätes mit den Applikationen 20 und 30 dargestellt 620, 630.

Der Datenträger 100 ist vorzugsweise eingerichtet zu erkennen, ob das Lesegerät 200 in der Lage ist, mehrere in seinem Ansprechfeld befindliche kommunikationsbereite Applikationen zu behandeln und eventuell auftretende Kollisionen aufzulösen. Der Datenträger 100 wertet dazu z.B. die Antwort des Lesegeräts 200 auf parallel ausgesendete Kommunikationsbereitschaftssignale aus und erkennt dadurch die Fähigkeiten des Lesegeräts 200 zur Kollisionsbehandlung. Auch ein Abbrechen der Kommunikation durch das Lesegerät 200 kann als Antwort angesehen werden, wenn es sich beispielsweise um ein Lesegerät 200 handelt, welches prinzipiell nur einen Datenträger in seinem Ansprechfeld verarbeiten kann. Falls sich dann mehrere Datenträger in dem Ansprechfeld befinden, wird von Seiten des Lesegeräts sämtliche Kommunikation mit einem Datenträger abgebrochen. So kann der Datenträger 100 beispielsweise von einem Verfahren gemäß der ersten Ausführungs-

form zu einem Verfahren gemäß der zweiten Ausführungsform umschalten, wenn das Lesegerät 200 nicht in der Lage ist, Kollisionen aufzulösen.

Eine weitere Möglichkeit, dem Lesegerät 200 anzuzeigen, dass sich noch kommunikationsbereite Applikationen im Ansprechfeld befinden, besitzt der erfindungsgemäßen Datenträger 100 dadurch, dass die Kommunikationseinrichtung 70 während des Ablaufs eines Antikollisionsverfahrens 400 Signale aussenden kann, die dem Lesegerät 200 die Kollision von wenigstens zwei Datenträgern vortäuschen. Das Lesegerät 200 wird dann zu einem späteren Zeitpunkt versuchen, Kontakt zu solchen Applikationen aufzunehmen. Bei dem zum Vortäuschen einer Kollision ausgesendeten Signal oder Datenmuster kann es sich z.B. um eine Codeverletzung (z.B. ISO 14443 Typ A: Manchester Code bei gleichzeitigem Senden einer "0" und einer "1") oder um einen Prüfsummenfehler handeln. Bei Antikollisionsverfahren mit mehreren Zeitschlitzen (z.B. ISO 14443 Typ B: Slotted Aloha Verfahren) können in unterschiedlichen Zeitschlitzen die verschiedenen Identifikationsnummern UID1, UID2, UIDn der auf dem Datenträger befindlichen Applikationen 10, 20, 30 ausgesendet werden, um dem Lesegerät 200 die Anwesenheit entsprechender Datenträger vorzutäuschen.

Für das Lesegerät 200 besteht auch die Möglichkeit, das Magnetfeld kurzzeitig abzuschalten um dann, falls es sich um Datenträger ohne eigene Energieversorgung handelt, nach deren Neustart (Power-On Reset) einen neuen Datenträger im Ansprechfeld auszuwählen. Erfindungsgemäß kann die Kommunikationseinrichtung 70 des Datenträgers 100 eingerichtet sein, in einem nichtflüchtigen Speicher des Datenträgers 100 Information darüber zu speichern, welche der Applikationen 10, 20, 30 zuletzt mit dem Lesegerät 200 kommuniziert hat, welche der Applikationen 10, 20, 30 eine aktive Kommunikation mit dem Lesegerät 200 bereits abgeschlossen hat und dergleichen.

Mit Hilfe einer solchen Information kann dann z.B. zunächst für eine Applikation 10, 20, 30 ein Kommunikationsbereitschaftssignal erzeugt werden, die nicht zuletzt mit dem Lesegerät 200 kommuniziert hat, um z.B. zu verhindern, dass immer dieselbe Applikation 10, 20, 30 zuerst zum Zuge kommt und andere Applikationen 10, 20, 30 möglicherweise lange Wartezeiten in Kauf nehmen müssen oder gar nicht erst zur Ausführung kommen. Es kann jedoch auch zunächst ein Kommunikationsbereitschaftssignal für diejenige Applikation 10, 20, 30 erzeugt werden, mit der das Lesegerät 200 zuletzt aktiv kommuniziert hat, um beispielsweise eine begonnene und noch nicht abgeschlossene Datenkommunikation zu Ende zu führen.

Figur 4 zeigt eine zweite Ausführungsform eines erfindungsgemäßen Datenträgers 100, der eine oder mehrere MIFARE-Speicherkarten MA, MB, MC, MD emulieren kann. MIFARE-Speicherkarten MA-MD besitzen einen in die Sektoren FS1, FS2, FS3, FS4 unterteilten Speicher, wobei in jedem Sektor FS1-FS4 höchstens eine Applikation gespeichert ist. Jeder Sektor FS1-FS4 ist separat durch ein eigenes Schlüsselpaar gegen unerlaubte Zugriffe geschützt, d.h. nur ein Lesegerät 200, welches die entsprechenden Schlüssel eines Sektors FS1-FS4 besitzt, kann auf den entsprechenden Sektor FS1-FS4 und die darin gespeicherten Daten zugreifen. Es ist üblich, dass speziellen Applikationen auf MIFARE-Speicherkarten MA-MD feste Sektoren FS1-FS4 zugeordnet sind. Die Applikationen sind in Fig. 4 mit 10A-40A, 10B-30B, 10C-30C, 40D bezeichnet, wobei der jeweils nachgestellte Buchstabe A, B, C, D die ursprüngliche Speicherkarte MA, MB, MC, MD bezeichnet, von welcher die jeweilige Applikation 10A-40A, 10B-30B, 10C-30C, 40D auf den Datenträger 100 übertragen worden ist. So ist z.B. die Applikation 30B dem Sektor FS3 der Speicherkarte MB zugeordnet.

Ein Lesegerät 200, welches eine solche Karte MA-MD erwartet, wird dementsprechend nur denjenigen Sektor FS1-FS4 der Speicherkarte MA-MD auslesen, in dem es die entsprechende Applikation 10A-40A, 10B-30B, 10C-30C, 40D sucht. Ist eine Applikation 10A-40A, 10B-30B, 10C-30C, 40D zwar auf einer Karte MA-MD gespeichert, jedoch in einem anderen als dem von dem Lesegerät 200 vorgesehenen Sektor GS1, GS2, GS3, so kann diese Applikation 10A-40A, 10B-30B, 10C-30C, 40D von dem Lesegerät 200 nicht gefunden werden. Um nun mehrere MIFARE-Speicherkarten MA-MD oder zumindest mehrere Applikationen 10A-40A, 10B-30B, 10C-30C, 40D von MIFARE-Speicherkarten MA-MD, die demselben festen Sektor FS1-FS4 zugeordnet sind, mittels eines Datenträgers 100 emulieren zu können, kann das erfindungsgemäße Verfahren in verschiedenen Varianten eingesetzt werden, die nachfolgend beschrieben werden.

Der Datenträger 100 umfasst dazu einen sektorierten Speicher 60, der prinzipiell wie ein Speicher einer MIFARE-Speicherkarte MA-MD aufgebaut ist. In jedem Sektor S1-S11 ist dabei höchstens eine der ursprünglichen MIFARE-Applikationen 10A-40A, 10B-30B, 10C-30C, 40D gespeichert. In einer effizienten ersten Variante, die in Figur 4 illustriert ist, wird nicht für jede Applikation 10A-40A, 10B-30B, 10C-30C, 40D notwendigerweise eine eigene Identifikationsnummer UID1-UID3 erzeugt. Es reicht vielmehr aus, wenn diejenigen Applikationen 10A-10C; 20A-20C; 30A-30C; 40A, 40D, die ursprünglich demselben festen Sektor FS1-FS4 zugeordnet waren, jeweils unterschiedliche Identifikationsnummern UID1-UID3 erhalten.

Die in den Sektoren S1-S11 des Datenträgers 100 gespeicherten Applikationen 10A-40A, 10B-30B, 10C-30C, 40D werden in Gruppen G1-G3 eingeteilt, die jeweils nur solche Applikationen 10A-40A; 10B-30B; 10C-30C, 40D enthalten, die ursprünglich paarweise verschiedenen festen Sektoren FS1-FS4 zu-

geordnet waren. Jeder dieser Gruppen G1-G3 wird eine eigene Identifikationsnummer UID1-UID3 zugeordnet und jeder Applikation 10A-40A, 10B-30B, 10C-30C, 40D innerhalb einer solchen Gruppe G1-G3 wird als zusätzliche Auswahlinformation der ursprünglich zugeordnete feste Sektor FS1-FS4 zugeordnet 10A(FS1)-40A(FS4), 10B(FS1)-30B(FS3), 10C(FS1)-30C(FS3), 40D(FS4). Diese derart zugeordnete Auswahlinformation erzeugt eine virtuelle Sektorzuordnung, die derjenigen einer emulierten MIFARE-Speicherkarte entspricht.

Die Kommunikationseinrichtung 70 erzeugt nun Kommunikationsbereitschaftssignale für diese Gruppen G1-G3 von Applikationen 10A-40A; 10B-30B; 10C-30C, 40D, wobei das Kommunikationsbereitschaftssignal eine Kommunikationsbereitschaft jeder einzelnen der Applikationen 10A-40A, 10B-30B, 10C-30C, 40D anzeigt. Das Lesegerät 200 kann über die Identifikationsnummer UID1-UID3 eine solche Gruppe G1-G3 von Applikationen 10A-40A; 10B-30B; 10C-30C, 40D zur Kommunikation auswählen. Die betreffende Gruppe erscheint dem Lesegerät 200 wie eine ursprüngliche MIFARE-Speicherkarte MA-MD. Über die zusätzliche Auswahlinformation FS1-FS4 kann das Lesegerät 200 dann aus der Gruppe G1-G3 die entsprechende Applikation 10A-40A, 10B-30B, 10C-30C, 40D auswählen, die derjenigen Sektorzuordnung GS1-GS3 entspricht, in der die gewünschte Applikation enthalten ist. Die Auswahlinformation FS1-FS4 in Form der virtuellen Sektorzuordnung erscheint dem Lesegerät 200 dabei wie eine feste Sektorzuordnung einer Applikation auf einer ursprünglichen MIFARE-Speicherkarte. Bei dieser Variante des Verfahrens zum Emulieren von MIFARE-Speicherkarten ist es für das Lesegerät 200 möglich, auf sämtliche auf dem Datenträger 100 gespeicherten Applikationen 10A-10C; 20A-20C; 30A-30C; 40A, 40D zuzugreifen, die ursprünglich demselben festen Sektor FS1-FS4 zugeordnet waren,

unabhängig von deren tatsächlicher Sektorposition S1-S11 auf dem Datenträger 100.

In einer zweiten, einfacheren Variante (nicht dargestellt) wird jeder Applikation 10A-40A, 10B-30B, 10C-30C, 40D eine eigene Identifikationsnummer UID1-UID3 zugeordnet. Auf diese Weise erscheint der Datenträger 100 einem Lesegerät 200 wie eine Vielzahl von MIFARE-Speicherkarten MA-MD, die alle jeweils nur eine Applikation 10A-40A, 10B-30B, 10C-30C, 40D enthalten. Die Information, welchem Sektor FS1-FS4 die jeweilige Applikation 10A-40A, 10B-30B, 10C-30C, 40D ursprünglich zugeordnet war, kann wiederum in der dieser Applikation 10A-40A, 10B-30B, 10C-30C, 40D zugeordneten zusätzlichen Auswahlinformation gespeichert werden.

Die Kommunikationseinrichtung 70 des Datenträgers 100 erzeugt somit Kommunikationsbereitschaftssignale für alle Applikationen 10A-40A, 10B-30B, 10C-30C, 40D mit jeweils unterschiedlichen Identifikationsnummern UID1-UID3. Das Lesegerät 200 kann dann eine Applikation 10A-40A, 10B-30B, 10C-30C, 40D über die entsprechende Identifikationsnummer UID1-UID3 auswählen und ausführen, sofern die in der zusätzlichen Auswahlinformation gespeicherte Sektorzuordnung FS1-FS4 mit der von dem Lesegerät 200 gewünschten Sektorzuordnung GS1-GS3 übereinstimmt. Das Lesegerät 200 kann auf diese Weise auf jede der auf dem Datenträger 100 gespeicherten Applikation 10A-40A, 10B-30B, 10C-30C, 40D separat zugreifen. Verschiedene Applikationen 10A-10C; 20A-20C; 30A-30C;40A, 40D, die ursprünglich demselben festen Sektor FS1-FS4 zugeordnet waren, sind nun alle für das Lesegerät 200 erreichbar, unabhängig von ihrer tatsächlichen Sektorposition S1-S11 auf dem Datenträger 100. Es ist jedoch möglich, dass das Lesegerät 200 eine große Anzahl von Applikationen 10-40A, 10B-30B, 10C-30C, 40D zur Kommunikation auswählt, die der vom Lesegerät 200 gewünschten Sektor-

zuordnung GS1-GS3 nicht entsprechen, da jeder Applikation 10A-40A, 10B-30B, 10C-30C, 40D eine eigene Identifikationsnummer UID1-UID3 zugeordnet worden ist. Auf diese Weise steigt jedoch der Gesamtkommunikationsaufwand zwischen dem Lesegerät 200 und den Applikationen 10A-40A, 10B-30B, 10C-30C, 40D auf dem Datenträger 100, weshalb im Allgemeinen das als erste Variante beschriebene Verfahren vorzuziehen ist, wenn ein effizienter Datenaustausch angestrebt wird.

In einer dritten Ausführungsform (nicht gezeigt) kann ein elektronisches Gerät, insbesondere ein Mobilfunkendgerät, als Datenträger 100 zur Kommunikation mit einem Lesegerät 200 ausgebildet sein. Das Mobilfunkendgerät umfasst dazu eine Kontaktlosschnittstelle, beispielsweise eine NFC-Schnittstelle. Zur Kommunikation mit dem Lesegerät 200 nimmt das Mobilfunkendgerät die Rolle des passiven Kommunikationspartners ("Slave") ein, während das Lesegerät 200 als aktiver Kommunikationspartner ("Master") agiert. Die auf dem Datenträger 100 vorliegenden Applikationen 10, 20, 30 sind dabei jeweils in separaten Speicherbereichen des Datenträgers 100 gespeichert, vorzugsweise jeweils eine Applikation 10, 20, 30 pro Speicherbereich.

Die Speicherbereiche befinden sich auf mehreren, in dem Mobilfunkendgerät integrierten sicheren Chipkarten, z.B. (U)SIM-Mobilfunkkarten, SD-Karten, EMV-Zahlungskarten oder dergleichen. Dadurch sind die entsprechenden Applikationen 10, 20, 30 und die von diesen erzeugten Daten vor unbefugtem Zugriff geschützt. Die Kommunikationseinrichtung 70 des Mobilfunkendgeräts steuert die Kommunikation der Applikationen 10, 20, 30 auf den Chipkarten mit dem Lesegerät 200 über die Kontaktlosschnittstelle. Auf diese Weise wird ein so genanntes "Secure-NFC" zwischen einem Lesegerät 200

und mehreren auf einem Datenträger 100 sicher gespeicherten Applikationen 10, 20, 30 ermöglicht.

Patentansprüche

1. Verfahren zur kontaktlosen Kommunikation eines Lesegeräts (200) mit zumindest zwei auf einem tragbaren Datenträger (100) befindlichen kommunikationsbereiten Applikationen (10, 20, 30), **gekennzeichnet durch** die Schritte:

Erzeugen eines ersten Kommunikationsbereitschaftssignals an das Lesegerät (200) für eine erste der zumindest zwei Applikationen (10, 20, 30), wobei das Kommunikationsbereitschaftssignal eine erste Identifikationsnummer (UID1) umfasst, die der ersten der zumindest zwei Applikationen (10, 20, 30) zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und

Erzeugen eines zweiten Kommunikationsbereitschaftssignals an das Lesegerät (200) für eine zweite der zumindest zwei Applikationen (10, 20, 30), wobei das zweite Kommunikationsbereitschaftssignal eine von der ersten Identifikationsnummer (UID1) verschiedene zweite Identifikationsnummer (UID2) umfasst, die dieser zweiten Applikation zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser zweiten Applikation anzeigt.

2. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet**, dass das erste Kommunikationsbereitschaftssignal für eine die erste Applikation umfassende erste Gruppe (G1) von Applikationen (10A-40A) erzeugt wird und die erste Identifikationsnummer (UID1) jeder der Applikationen (10A-40A) in der ersten Gruppe (G1) zugeordnet ist und dass das zweite Kommunikationsbereitschaftssignal für eine die zweite Applikation umfassende zweite Gruppe (G2) von Applikationen (10B-30B) erzeugt wird und die zweite Identifikationsnummer (UID2) jeder der Applikationen (10B-30B) in der zweiten

Gruppe (G2) zugeordnet ist, wobei das erste Kommunikationsbereitschaftssignal dem Lesegerät (200) die Kommunikationsbereitschaft jeder der Applikationen (10A-40A) der ersten Gruppe (G1) anzeigt und das zweite Kommunikationsbereitschaftssignal dem Lesegerät (200) die Kommunikationsbereitschaft jeder der Applikationen (10B-30B) der zweiten Gruppe (G2) anzeigt.

3. Verfahren gemäß Anspruch 2, **dadurch gekennzeichnet,** dass jeder der Applikationen (10A-40A) der ersten Gruppe (G1) und/oder jeder der Applikationen (10B-30B) der zweiten Gruppe (G2) jeweils eine zusätzliche Auswahlinformation zugeordnet wird.

4. Verfahren gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet,** dass das Lesegerät (200) Suchsignale aussendet, wobei die für die Applikationen (10, 20, 30) erzeugten Signale Antwortsignale auf die Suchsignale sind.

5. Verfahren gemäß einem der Ansprüche 1 bis 4, **gekennzeichnet durch** den weiteren Schritt des Umschaltens zwischen den Applikationen (10, 20, 30) zur Kommunikation der Applikation (10, 20, 30) mit einem Lesegerät (200).

6. Verfahren gemäß Anspruch 5, **dadurch gekennzeichnet,** dass das Umschalten durch Verzweigen oder durch Kontextwechsel erfolgt.

7. Verfahren gemäß einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet,** dass das Lesegerät (200) eine oder mehrere der zumindest zwei Applikationen (10, 20, 30) über die den Applikationen (10, 20, 30) zugeordneten Identifikationsnummern (UID1-UIDn) für die weitere Kommunikation auswählt.

8. Verfahren gemäß Anspruch 7 mit Anspruch 3, **dadurch gekennzeichnet,** dass das Lesegerät (200) eine oder mehrere der zumindest zwei Applikationen (10A-40A, 10B-30B, 10C-30C, 40D) über die den Applikationen (10A-40A, 10B-30B, 10C-30C, 40D) zugeordneten Identifikationsnummern (UID1-UID3) und über die den Applikationen (10A-40A, 10B-30B, 10C-30C, 40D) zugeordnete zusätzliche Auswahlinformation für die weitere Kommunikation auswählt.

9. Verfahren gemäß Anspruch 7 oder 8, **dadurch gekennzeichnet,** dass für eine oder mehrere der zumindest zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, das Kommunikationsbereitschaftssignal erzeugt wird, während die Kommunikation mit einer oder mehreren anderen der zumindest zwei Applikationen (10, 20, 30), die vom Lesegerät (200) für die weitere Kommunikation ausgewählt worden sind, noch nicht abgeschlossen ist.

10. Verfahren gemäß einem der Ansprüche 7 bis 9, **dadurch gekennzeichnet,** dass für eine oder mehrere der zumindest zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, das Kommunikationsbereitschaftssignal erzeugt wird, nachdem eine oder mehrere andere der zumindest zwei Applikationen (10, 20, 30) nach abgeschlossener Kommunikation mit dem Lesegerät (200) suspendiert worden sind.

11. Verfahren gemäß einem der Ansprüche 7 bis 10, **dadurch gekennzeichnet,** dass der Datenträger (100) dem Lesegerät (200) mittels Kollisionssignalen mitteilt, dass eine oder mehrere der zumindest zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunika-

tion ausgewählt worden sind, vorhanden sind, indem Signale gesendet werden, die eine Kollisionen zwischen einer Mehrzahl von Applikationen (10, 20, 30) vortäuschen.

12. Verfahren gemäß einem der Ansprüche 7 bis 10, **dadurch gekennzeichnet**, dass der Datenträger (100) dem Lesegerät (200) mittels einer Belegung von ein oder mehreren Zeitschlitzen mitteilt, dass eine oder mehrere der zumindest zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, vorhanden sind.

13. Verfahren gemäß einem der Ansprüche 7 bis 12, **gekennzeichnet durch** den weiteren Schritt des Speicherns von Information in einem nichtflüchtigen Speicher des Datenträgers (100) darüber, welche der zumindest zwei Applikationen (10, 20, 30) zuletzt von dem Lesegerät (200) für die weitere Kommunikation ausgewählt worden ist.

14. Verfahren gemäß einem der Ansprüche 7 bis 12, **gekennzeichnet durch** den weiteren Schritt des Speicherns von Information in einem nichtflüchtigen Speicher des Datenträgers (100) darüber, welche der zumindest zwei Applikationen (10, 20, 30) eine aktive Kommunikation mit dem Lesegerät (200) bereits abgeschlossen hat.

15. Verfahren gemäß Anspruch 13 oder 14, **dadurch gekennzeichnet**, dass bei erneuter Kommunikation des Lesegeräts (200) mit dem Datenträger (100) zunächst für eine der zumindest zwei Applikationen (10, 20, 30), die verschieden ist von der durch die gespeicherte Information bezeichneten Applikation (10, 20, 30), ein Kommunikationsbereitschaftssignal ausgesendet wird.

16. Verfahren gemäß Anspruch 13 oder 14, **dadurch gekennzeichnet**, dass bei erneuter Kommunikation des Lesegeräts (200) mit dem Datenträger (100) zunächst für die Applikation (10, 20, 30), mit der zuletzt aktiv kommuniziert wurde, ein Kommunikationsbereitschaftssignal ausgesendet wird.

17. Verfahren gemäß einem der Ansprüche 7 bis 16, **dadurch gekennzeichnet**, dass das Lesegerät (200) eine für die weitere Kommunikation ausgewählte Applikation (10, 20, 30) über eine dynamisch vergebene Sitzungsnummer (CID1-CIDn) adressiert.

18. Verfahren gemäß Anspruch 17, **dadurch gekennzeichnet**, dass beim Adressieren die Sitzungsnummer (CID1-CIDn) auf dem Datenträger (100) mit der der Applikation (10, 20, 30) zugeordneten Identifikationsnummer (UID1-UIDn) verknüpft wird.

19. Verfahren nach Anspruch 18 mit Anspruch 3, **dadurch gekennzeichnet**, dass beim Adressieren die Sitzungsnummer (CID1-CID3) auf dem Datenträger (100) zusätzlich mit der der Applikation (10A-40A, 10B-30B, 10C-30C, 40D) zugeordneten zusätzlichen Auswahlinformation verknüpft wird.

20. Verfahren gemäß einem der Ansprüche 1 bis 19, **dadurch gekennzeichnet**, dass der Datenträger (100) anhand einer Antwort des Lesegeräts (200) auf von dem Datenträger (100) ausgesendete Kommunikationsbereitschaftssignale erkennt, ob das Lesegerät (200) eingerichtet ist, eine Kollision zwischen einer Mehrzahl von Applikationen (10, 20, 30) aufzulösen.

21. Verfahren gemäß einem der Ansprüche 1 bis 20, **dadurch gekennzeichnet**, dass das Lesegerät (200) mit mehreren der zumindest zwei Applikationen (10, 20, 30) parallel kommuniziert.

22. Verfahren gemäß einem der Ansprüche 1 bis 21, **dadurch gekennzeichnet**, dass das Lesegerät (200) die Identifikationsnummern (UID1-UIDn) als Identifikationsnummern unterschiedlicher Datenträger interpretiert.

23. Verfahren gemäß Anspruch 22 mit Anspruch 3, **dadurch gekennzeichnet**, dass der Datenträger (100) die zusätzliche Auswahlinformation als virtuelle Sektorzuordnung (FS1-FS4) erzeugt und das Lesegerät (200) die zusätzliche Auswahlinformation als Sektorzuordnung (FS1-FS4) eines Speicherbereichs eines der unterschiedlichen Datenträger (MA-MD) interpretiert, wobei die unterschiedlichen Datenträger (MA-MD) emulierte Datenträger (MA-MD) sein können.

24. Kontaktlos kommunizierender tragbarer Datenträger (100), umfassend zumindest zwei darauf gespeicherte Applikationen (10, 20, 30) und eine Kommunikationseinrichtung (70) zum Steuern einer Kommunikation zwischen einem Lesegerät (200) und den zumindest zwei Applikationen (10, 20, 30), **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, Kommunikationsbereitschaftssignale an das Lesegerät (200) zu erzeugen, die jeweils dem Lesegerät (200) eine Kommunikationsbereitschaft für eine der Applikationen (10, 20, 30) anzeigen und eine der entsprechenden kommunikationsbereiten Applikation (10, 20, 30) zugeordnete Identifikationsnummer umfassen.

25. Datenträger (100) gemäß Anspruch 24, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, Kommunikationsbe-

reitschaftssignale an das Lesegerät (200) zu erzeugen, die jeweils dem Lesegerät eine Kommunikationsbereitschaft jeder Applikation (10A-40A; 10B-30B; 10C-30C, 40D) einer die eine Applikation umfassenden Gruppe (G1; G2; G3) von Applikationen (10A-40A; 10B-30B; 10C-30C, 40D) anzeigen und eine jeder der Applikationen (10A-40A; 10-30B; 10C-30C, 40D) der Gruppe (G1; G2; G3) zugeordnete Identifikationsnummer (UID1; UID2; UID3) umfassen.

26. Datenträger gemäß Anspruch 25, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, jeder der Applikationen (10A-40A; 10B-30B; 10C-30C, 40D) der Gruppe (G1; G2; G3) jeweils eine zusätzliche Auswahlinformation zuzuordnen.

27. Datenträger (100) gemäß einem der Ansprüche 24 bis 26, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, die Kommunikationsbereitschaftssignale als Antwortsignale auf von einem Lesegerät (200) empfangene Suchsignale zu erzeugen.

28. Datenträger (100) gemäß einem der Ansprüche 24 bis 27, **gekennzeichnet durch** eine Umschalteinrichtung (50), die eingerichtet ist, zur Kommunikation der Applikationen (10, 20, 30) mit einem Lesegerät (200) zwischen den Applikationen (10, 20, 30) des Datenträgers (100) umzuschalten.

29. Datenträger (100) gemäß Anspruch 28, **dadurch gekennzeichnet**, dass die Umschalteinrichtung (50) eingerichtet ist, zwischen den Applikationen (10, 20, 30) des Datenträgers (100) mittels Verzweigens oder Kontextwechsels umzuschalten.

30. Datenträger (100) gemäß einem der Ansprüche 24 bis 29, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, die Kommunikation zwischen einem Lesegerät (200) und einer von dem Lesegerät (200) über eine Sitzungsnummer (CID1-CIDn) adressierten Applikation (10, 20, 30) herzustellen.

31. Datenträger (100) gemäß Anspruch 30, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, beim Adressieren der Applikation (10, 20, 30) die Sitzungsnummer (CID1-CIDn) mit der der Applikation (10, 20, 30) zugeordneten Identifikationsnummer (UID1-UIDn) zu verknüpfen.

32. Datenträger (100) gemäß Anspruch 31 mit Anspruch 26, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, beim Adressieren der Applikation (10A-40A, 10B-30B, 10C-30C, 40D) die Sitzungsnummer (CID1-CID3) zusätzlich mit der der Applikation (10A-40A, 10B-30B, 10C-30C, 40D) zugeordneten zusätzlichen Auswahlinformation zu verknüpfen.

33. Datenträger (100) gemäß einem der Ansprüche 24 bis 32, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, diejenigen Applikationen (10, 20, 30) aus den zumindest zwei Applikationen (10, 20, 30) zu ermitteln, die zur Kommunikation mit einem Lesegerät (200) bereit sind.

34. Datenträger (100) gemäß Anspruch 33, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, für eine oder mehrere der zumindest zwei Applikationen (10, 20, 30), die zur Kommunikation mit einem Lesegerät (200) bereit sind und noch nicht mit einem Lesegerät (200)

kommunizieren, Kommunikationsbereitschaftssignale auszusenden, während die Kommunikation mit einer oder mehreren anderen der zumindest zwei Applikationen (10, 20, 30) noch nicht abgeschlossen ist.

35. Datenträger (100) gemäß Anspruch 33 oder 34, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, für eine oder mehrere der zumindest zwei Applikationen (10, 20, 30), die zur Kommunikation mit einem Lesegerät (200) bereit sind und noch nicht mit einem Lesegerät (200) kommunizieren, Kommunikationsbereitschaftssignale auszusenden, nachdem eine oder mehrere andere der zumindest zwei Applikationen (10, 20, 30) nach abgeschlossener Kommunikation mit einem Lesegerät (200) suspendiert worden sind.

36. Datenträger (100) gemäß einem der Ansprüche 24 bis 35, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, dem Lesegerät (200) über Kollisionssignale, die eine Kollision zwischen einer Mehrzahl von Applikationen vortäuschen, mitzuteilen, dass noch eine oder mehrere der zumindest zwei auf dem Datenträger (100) befindlichen Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, vorhanden sind.

37. Datenträger (100) gemäß einem der Ansprüche 24 bis 36, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, in einem nichtflüchtigen Speicher des Datenträgers (100) Informationen darüber zu speichern, welche der zumindest zwei Applikationen (10, 20, 30) zuletzt mit einem Lesegerät (200) kommuniziert hat.

38. Datenträger (100) gemäß Anspruch 37, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, bei erneuter Kontakt-

aufnahme eines Lesegeräts (200) zum Datenträger (100) zunächst für eine der zumindest zwei Applikationen (10, 20, 30), die verschieden ist von der durch die gespeicherte Information bezeichneten Applikation (10, 20, 30), ein Kommunikationsbereitschaftssignal auszusenden.

39. Datenträger (100) gemäß einem der Ansprüche 24 bis 38, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, anhand einer Antwort eines Lesegeräts (200) auf von der Kommunikationseinrichtung (70) ausgesendete Kommunikationsbereitschaftssignale zu erkennen, ob das Lesegerät (200) eingerichtet ist, Kollisionen zwischen einer Mehrzahl von Applikationen aufzulösen.

40. Datenträger (100) gemäß einem der Ansprüche 24 bis 39, **dadurch gekennzeichnet**, dass der Datenträger (100) als kontaktlos kommunizierende Chipkarte, kontaktlos kommunizierendes Label, kontaktlos kommunizierendes Ausweisdokument oder als eine (U)SIM-Mobilfunkkarte ausgebildet ist.

41. Datenträger (100) gemäß einem der Ansprüche 24 bis 40, **dadurch gekennzeichnet**, dass der Datenträger (100) ein Dual-Interface aufweist und sowohl kontaktlos als auch kontaktbehaftet betrieben werden kann.

42. Datenträger (100) gemäß einem der Ansprüche 24 bis 39, **dadurch gekennzeichnet**, dass der Datenträger (100) als Sicherheitsmodul in einem Gerät, das Kommunikationsmittel zur kontaktlosen Kommunikation umfasst, ausgebildet ist, wobei das Sicherheitsmodul über Softwaremittel verfügt, um über die Kommunikationsmittel des Geräts kontaktlos zu kommunizieren.

43. Datenträger (100) gemäß einem der Ansprüche 24 bis 42, **gekennzeichnet durch** einen Speicher (60), der in Sektoren (S1-S11) unterteilt ist, wobei in

jedem der Sektoren (S1-S11) jeweils höchstens eine der zumindest zwei Applikationen (10A-40A, 10B-30B, 10C-30C, 40D) gespeichert ist.

44. Datenträger (100) gemäß Anspruch 43 mit Anspruch 26, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, den zumindest zwei Applikationen (10A-40A, 10B-30B, 10C-30C, 40D) die zusätzliche Auswahlinformation in der Form einer virtuellen Sektorzuordnung (FS1-FS4) zuzuordnen und Kommunikationsbereitschaftssignale für die Gruppen (G1; G2; G3) von Applikationen zu erzeugen, wobei die Gruppen (G1; G2; G3) jeweils Applikationen (10A-40A; 10B-30B; 10C-30C, 40D) mit paarweise unterschiedlichen virtuellen Sektorzuordnungen (FS1-FS4) umfassen.

45. Datenträger (100) gemäß Anspruch 43 oder 44, **dadurch gekennzeichnet**, dass jeder der Sektoren (S1-S11) für einen Zugriff auf darin gespeicherte Applikationen (10A-40A, 10B-30B, 10C-30C, 40D) durch ein Lesegerät (200) separat zugriffsgeschützt ist.

46. Datenträger (100) gemäß einem den Ansprüche 24 bis 39, **dadurch gekennzeichnet**, dass der Datenträger (100) als elektronisches Gerät, insbesondere als Mobilfunkendgerät, mit einer Kontaktlosschnittstelle zur Kommunikation mit einem Lesegerät (200) und mit einer Mehrzahl von Speichern ausgebildet ist, wobei in jedem der Speicher jeweils höchstens eine der zumindest zwei Applikationen (10, 20, 30) gespeichert ist.

47. Datenträger (100) nach Anspruch 46, **dadurch gekennzeichnet**, dass die Kontaktlosschnittstelle als NFC-Schnittstelle ausgebildet ist und der Datenträger (100) eingerichtet ist, zur Kommunikation mit einem Lesegerät (200) im passiven Modus betrieben zu werden.

48. Datenträger (100) nach Anspruch 46 oder 47, **dadurch gekennzeichnet**, dass die Speicher auf in den Datenträger (100) integrierten Chipkarten, insbesondere (U)SIM-Mobilfunkkarten, sicheren digitalen Speicherkarten oder EMV-Zahlungskarten, ausgebildet sind.

FIG 1

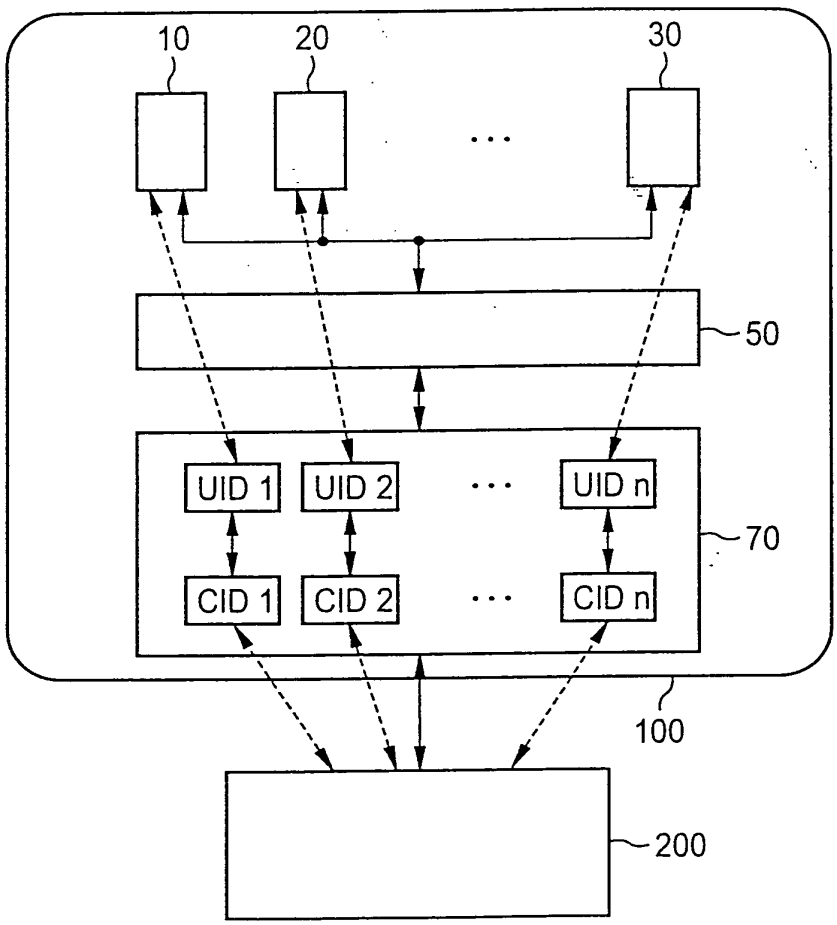
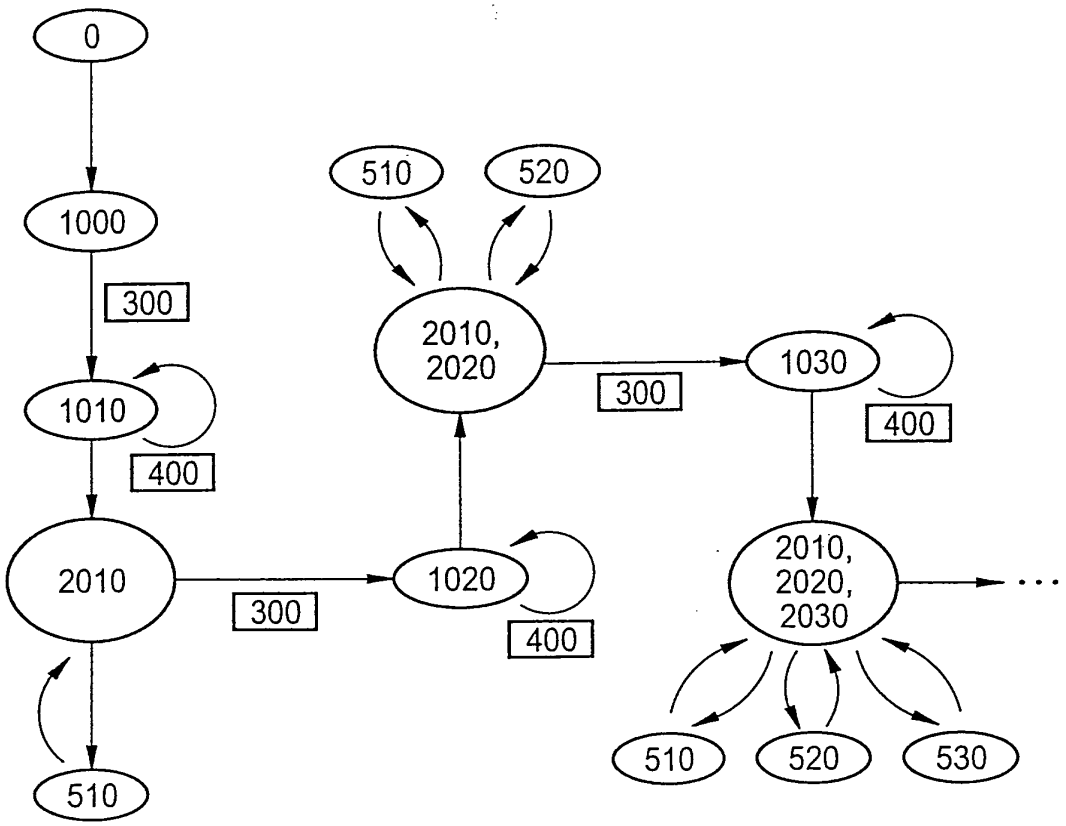


FIG 2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2020
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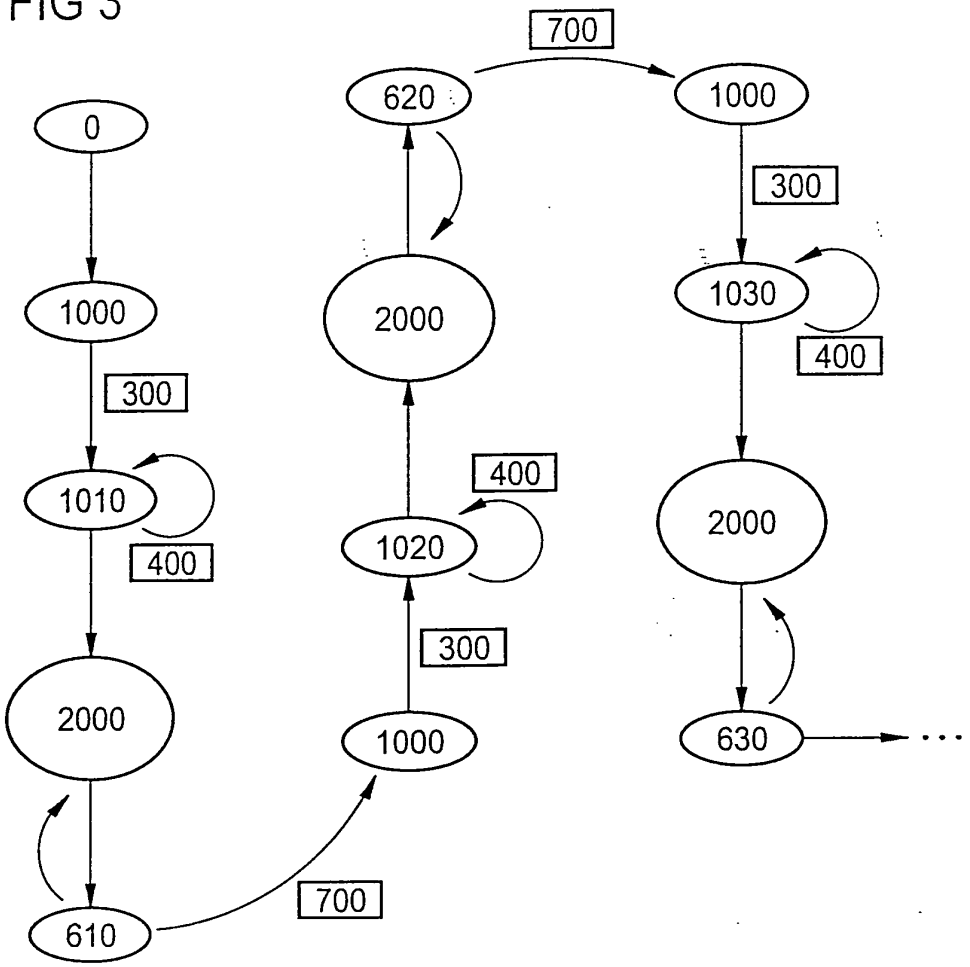
2010,
2020,
2030
510
520
530

FIG 3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300
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2000
610
700
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1000
700
1000
300
1030
400
2000
630

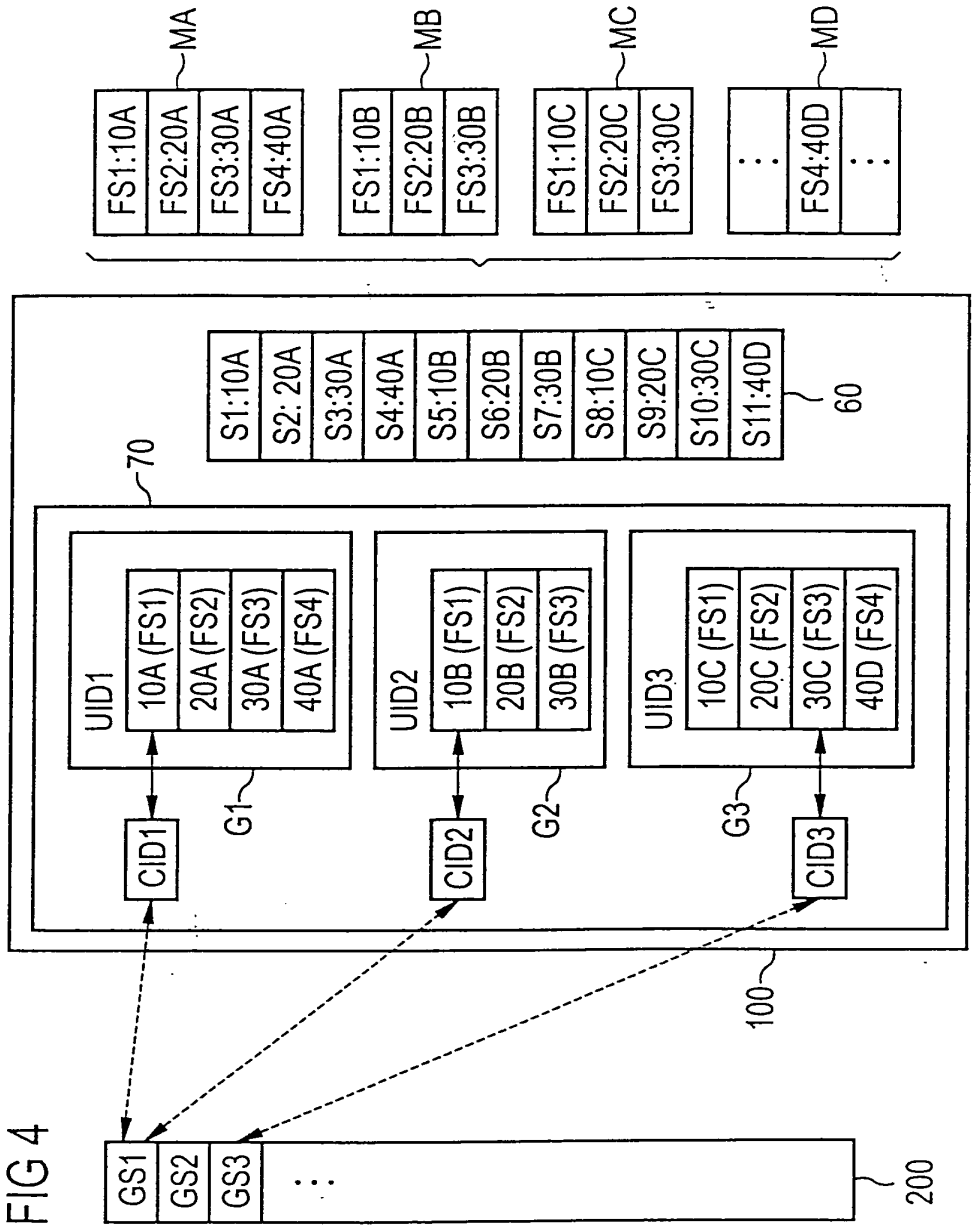
MA
MB
MC
MD
FS1:10A
FS2:20A
FS3:30A
FS4:40A
FS1:10B
FS2:20B
FS3:30B
FS1:10C
FS2:20C
FS3:30C
FS4:40D
S1:10A
S2: 20A
S3:30A
S4:40A
S5:10B
S6:20B
S7:30B
S8:10C
S9:20C
S10:30C
S11:40D
60
70
UID1
10A (FS1)
20A (FS2)
30A (FS3)
40A (FS4)
UID2
10B (FS1)
20B (FS2)
30B (FS3)
UID3
10C (FS1)
20C (FS2)
30C (FS3)
40D (FS4)
G1
G2
G3
CID1
CID2
CID3
100
GS1
GS2
GS3
200

FIG 4

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

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(81) Bestimmungsstaaten *(soweit nicht anders angegeben, für jede verfügbare nationale Schutzrechtsart)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK,

[Fortsetzung auf der nächsten Seite]

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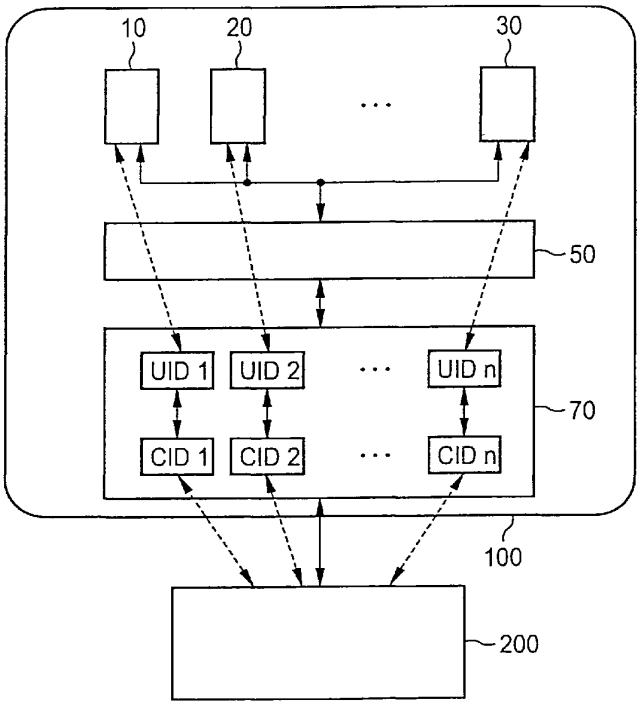
(54) Title: DATA STORAGE MEDIUM AND METHOD FOR CONTACTLESS COMMUNICATION BETWEEN THE DATA STORAGE MEDIUM AND A READER

(54) Bezeichnung: DATENTRÄGER UND VERFAHREN ZUR KONTAKTLOSEN KOMMUNIKATION ZWISCHEN DEM DATENTRÄGER UND EINEM LESEGERÄT



(57) Abstract: The present invention relates to a method and an appropriately customized data storage medium for contactless, particularly parallel, communication between a reader (200) and at least two applications (10, 20, 30) on a portable data storage medium (100) which are ready for communication. In this case, a first communication readiness signal is produced for a first application (10, 20, 30) and is sent to the reader (200), the signal comprising a first identification number which is associated with the first application (10, 20, 30) and indicates to the reader (200) that this first application is ready for communication, and a second communication readiness signal is produced for a second application (10, 20, 30) and is sent, the second signal comprising a second identification number which is different from the first identification number and which is associated with this second application and indicates to the reader (200) that this second application is ready for communication. The identification numbers respectively pretend to the reader that a data storage medium is ready for communication. This provides the reader with the impression that it is in communication with applications from two separate data storage media.

[Fortsetzung auf der nächsten Seite]

LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Bestimmungsstaaten *(soweit nicht anders angegeben, für jede verfügbare regionale Schutzrechtsart)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasisches (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Erklärungen gemäß Regel 4.17:

— *hinsichtlich der Berechtigung des Anmelders, ein Patent zu beantragen und zu erhalten (Regel 4.17 Ziffer ii)*

— *hinsichtlich der Berechtigung des Anmelders, die Priorität einer früheren Anmeldung zu beanspruchen (Regel 4.17 Ziffer iii)*

— *Erfindererklärung (Regel 4.17 Ziffer iv)*

Veröffentlicht:

— *mit internationalem Recherchenbericht*

— *vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eintreffen*

(88) Veröffentlichungsdatum des internationalen Recherchenberichts: 13. März 2008

(57) Zusammenfassung: Die vorliegende Erfindung betrifft ein Verfahren und einen entsprechend eingerichteten Datenträger zur kontaktlosen, insbesondere parallelen, Kommunikation eines Lesegeräts (200) mit zumindest zwei auf einem tragbaren Datenträger (100) befindlichen kommunikationsbereiten Applikationen (10, 20, 30). Dabei wird ein erstes Kommunikationsbereitschaftssi gnal für eine erste Applikation (10, 20, 30) erzeugt und an das Lesegerät (200) gesendet, wobei das Signal eine erste Identifikationsnummer umfasst, die der ersten Applikation (10, 20, 30) zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und ein zweites Kommunikationsbereitschaftssignal für eine zweite Applikation (10, 20, 30) erzeugt und gesendet, wobei das zweite Signal eine von der ersten Identifikationsnummer verschiedene zweite Identifikationsnummer umfasst, die dieser zweiten Applikation zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser zweiten Applikation anzeigt. Die Identifikationsnummern täuschen dabei dem Lesegerät jeweils die Kommunikationsbereitschaft eines Datenträgers vor. Das Lesegerät hat dadurch den Eindruck, mit Applikationen von zwei separaten Datenträgern zu kommunizieren.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/005185

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06K7/00 G07F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F G07F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/010943 A (INNOVISION RES & TECH PLC [GB]; LAMACRAFT KEVIN [GB]; FEUCHTWANGER DAV) 2 February 2006 (2006-02-02) page 4, line 15 - page 5, line 9 page 40, line 10 - page 44, line 13	1-48
X	EP 1 450 299 A (DAINIPPON PRINTING CO LTD [JP]) 25 August 2004 (2004-08-25) paragraph [0020] - paragraph [0027]	1,4-7, 21,22, 24, 27-29, 33,37, 38, 40-43, 46-48

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 Januar 2008	24/01/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Chiarizia, Salvatore

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2007/005185

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006010943 A	02-02-2006	EP 1779303 A1	02-05-2007
		GB 2413246 A	19-10-2005
		US 2007274242 A1	29-11-2007
EP 1450299 A	25-08-2004	CN 1556967 A	22-12-2004
		WO 03046826 A1	05-06-2003
		JP 2003162698 A	06-06-2003
		TW 272540 B	01-02-2007
		US 2004199784 A1	07-10-2004

Form PCT/ISA/210 (patent family annex) (April 2005)

INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen
PCT/EP2007/005185

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
INV. G06K7/00 G07F7/10

Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC

B. RECHERCHIERTE GEBIETE

Recherchierter Mindestprüfstoff (Klassifikationssystem und Klassifikationssymbole)
G06F G07F G06K

Recherchierte, aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)
EPO-Internal, WPI Data

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
X	WO 2006/010943 A (INNOVISION RES & TECH PLC [GB]; LAMACRAFT KEVIN [GB]; FEUCHTWANGER DAV) 2. Februar 2006 (2006-02-02) Seite 4, Zeile 15 - Seite 5, Zeile 9 Seite 40, Zeile 10 - Seite 44, Zeile 13	1-48
X	EP 1 450 299 A (DAINIPPON PRINTING CO LTD [JP]) 25. August 2004 (2004-08-25) Absatz [0020] - Absatz [0027]	1,4-7, 21,22, 24, 27-29, 33,37, 38, 40-43, 46-48

☐ Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen ☒ Siehe Anhang Patentfamilie

* Besondere Kategorien von angegebenen Veröffentlichungen :
"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist
"E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist
"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)
"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht
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"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann allein aufgrund dieser Veröffentlichung nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden
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"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

Datum des Abschlusses der internationalen Recherche	Absendedatum des internationalen Recherchenberichts
16. Januar 2008	24/01/2008

Name und Postanschrift der Internationalen Recherchenbehörde	Bevollmächtigter Bediensteter
Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Chiarizia, Salvatore

Formblatt PCT/ISA/210 (Blatt 2) (April 2005)

INTERNATIONALER RECHERCHENBERICHT

Angaben zu Veröffentlichungen, die zur selben Patentfamilie gehören

Internationales Aktenzeichen
PCT/EP2007/005185

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
WO 2006010943 A	02-02-2006	EP 1779303 A1	02-05-2007
		GB 2413246 A	19-10-2005
		US 2007274242 A1	29-11-2007
EP 1450299 A	25-08-2004	CN 1556967 A	22-12-2004
		WO 03046826 A1	05-06-2003
		JP 2003162698 A	06-06-2003
		TW 272540 B	01-02-2007
		US 2004199784 A1	07-10-2004

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/EP2007/005185

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Document type: Certified copy of priority document

Document details: Country/Office: DE
Number: 10 2006 027 200.5
Filing date: 12 June 2006 (12.06.2006)

Date of receipt at the International Bureau: 24 September 2007 (24.09.2007)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

BUNDESREPUBLIK DEUTSCHLAND

Prioritätsbescheinigung
DE 10 2006 027 200.5
über die Einreichung einer Patentanmeldung

Aktenzeichen:	10 2006 027 200.5
Anmeldetag:	12. Juni 2006
Anmelder/Inhaber:	Giesecke & Devrient GmbH, 81677 München/DE
Bezeichnung:	Datenträger und Verfahren zur kontaktlosen Kommunikation zwischen dem Datenträger und einem Lesegerät
IPC:	G 06 K 19/073

Die angehefteten Stücke sind eine richtige und genaue Wiedergabe der Teile der am 12. Juni 2006 eingereichten Unterlagen dieser Patentanmeldung unabhängig von gegebenenfalls durch das Kopierverfahren bedingten Farbabweichungen.

München, den 3. August 2007
Deutsches Patent- und Markenamt
Der Präsident
Im Auftrag

Hintermeier

A 9161
11/06
Pat/GBM

Datenträger und Verfahren zur kontaktlosen Kommunikation zwischen dem Datenträger und einem Lesegerät

Die vorliegende Erfindung betrifft ein Verfahren zur kontaktlosen Kommunikation von mindestens zwei auf einem gemeinsamen tragbaren Datenträger gespeicherten Applikationen mit einem Lesegerät und einen entsprechend eingerichteten Datenträger. Ein Datenträger im Sinne der Erfindung kann z.B. eine kontaktlos kommunizierende Chipkarte, ein kontaktlos kommunizierendes Label, ein kontaktlos kommunizierendes Ausweisdokument oder ein zur kontaktlosen Kommunikation ausgestattetes Sicherheitsmodul SAM (secure application module) sein.

Im Stand der Technik (Finkenzeller, Klaus: RFID-Handbuch, München, 2002) werden verschiedene kontaktlos kommunizierende Datenträger beschrieben, beispielsweise Chipkarten und RFID-Transponder (radio frequency identification transponder), z.B. nach dem Standard ISO/IEC 14443. Dabei handelt es sich um sogenannte Proximity-Coupling-Chipkarten, die häufig im Anwendungsbereich "Ticketing" Verwendung finden, also beispielsweise als Fahrausweis im öffentlichen Nahverkehr. Die Energieversorgung des Datenträgers erfolgt dabei üblicherweise durch das magnetische Wechselfeld eines Lesegerätes. Die Reichweite eines solchen Datenträgers beträgt ca. 7 bis 15 cm. Die Erfindung ist aber nicht auf Transponder-Chipkarten mit diesen kurzen Reichweiten beschränkt, sondern kann auch im Zusammenhang mit anderen kontaktlos kommunizierenden Datenträgern mit anderen Reichweiten und / oder nach anderen Standards Verwendung finden. Prinzipiell sind auch Datenträger mit eigener Energiequelle einsetzbar.

Wird ein solcher Datenträger in das Ansprechfeld eines Lesegerätes gebracht, wodurch seine Energieversorgung einsetzt und er in einen betriebsbereiten Modus versetzt wird, kann er ein vom Lesegerät zyklisch ausgesen-

detes Suchsignal empfangen und mittels eines ersten Antwortsignals dem Lesegerät seine Kommunikationsbereitschaft anzeigen. Sobald das Lesegerät dieses Signal empfangen hat, startet es einen Selektionsprozess mit Hilfe eines sogenannten Antikollisionsverfahrens, um gezielt einen Datenträger zur weiteren Kommunikation auszuwählen, auch wenn sich gleichzeitig eine Mehrzahl von kommunikationsbereiten Datenträgern im Ansprechfeld des Lesegeräts befinden. Die Auswahl eines Datenträgers erfolgt dabei anhand einer eindeutigen Identifikationsnummer des Datenträgers, beispielsweise eines UID (unique identifier), eines PUPI (pseudo-unique PICC identifier, PICC=proximity ICC, ICC=integrated circuit card) oder dergleichen. Für Datenträger gemäß ISO/IEC 14443 gilt weiterhin, dass ein zur Kommunikation ausgewählter Datenträger während der Kommunikation über eine vom Lesegerät dynamisch vergebene eindeutige Sitzungsnummer (Session-ID, CID) adressierbar ist. In diesem Zustand antwortet ein solcher Datenträger nicht mehr auf die vorerwähnten und weiterhin vom Lesegerät ausgesendeten Suchsignale. Auf diese Weise kann das Lesegerät weitere im Ansprechfeld befindliche Datenträger über ihre eindeutige Identifikationsnummer selektieren und auch diesen wiederum eindeutige Sitzungsnummern zuordnen. Nach ISO/IEC 14443 können bis zu 16 Datenträger auf diese Weise gleichzeitig zur Kommunikation ausgewählt und über dementsprechend 16 unterschiedliche Sitzungsnummern adressiert werden. Ein vom Lesegerät ausgesendetes und mittels der Sitzungsnummer adressiertes Kommando wird dann stets nur von dem Datenträger verarbeitet, dem diese Sitzungsnummer zugeordnet worden ist.

Weiterhin ist bekannt, dass sich auf einem tragbaren Datenträger mehrere Applikationen gleichzeitig befinden können und dass die dazugehörigen Applikationsprozesse nebenläufig ausgeführt werden können, wenn auf dem Datenträger ein Betriebssystem eingerichtet ist, das die dazu notwendi-

gen Mechanismen zur Verfügung stellt. Nebenläufiges Ausführen von Prozessen bedeutet, dass diese quasi gleichzeitig ausgeführt werden, indem immer wieder zwischen verschiedenen Prozessen umgeschaltet wird. Ein Umschalten zwischen verschiedenen Prozessen bedeutet, dass diese Prozesse abwechselnd dem Prozessor zugeführt werden, um tatsächliche Rechenzeit zu erhalten. Ein Applikationsprozess bezeichnet eine sich in Ausführung befindliche Applikation. Im Rahmen dieser Erfindung werden im Folgenden sowohl eine Applikation als auch der ihr zugehörige Applikationsprozess stets als Applikation bezeichnet.

Es ist möglich, eine Mehrzahl von verschiedenen nebenläufigen Applikationen, beispielsweise über ihre Applikationsbezeichner AID (application identifier), über verschiedene logische Kanäle (logical channels) anzusprechen. Logische Kanäle machen es möglich, über eine einzige Schnittstelle parallel mehrere virtuelle Kanäle vorzugeben, indem die entsprechenden Kommunikationsprotokolle so ausgelegt sind, dass der adressierte logische Kanal mitkodiert wird. Auf diese Weise können somit parallel mehrere Applikationen auf dem Datenträger durch Angabe des jeweils zu benutzenden Kanals über den Applikationsbezeichner angesprochen werden.

Die heute gängigen Protokolle und die Kodierung der zu übertragenden Daten (APDU, application data unit, eine Datenübertragungsform, die auf einem Anweisung/Antwort-Schema basiert) erlauben bis zu vier logische Kanäle, die mittels zwei spezieller Bits kodiert sind. Jedoch enthalten die auf ein von außerhalb des Datenträgers erhaltenes Kommando erzeugten Antworten des Datenträgers keine Angaben mehr über den logischen Kanal. Dies hat zur Folge, dass externe Anwendungen, die mit einer Mehrzahl von nebenläufigen Applikationen auf einem Datenträger kommunizieren wollen, untereinander synchronisiert sein müssen, da eine externe Anwendung anhand

der Antwort einer Applikation des Datenträgers nicht entscheiden kann, ob diese die von ihr erwartete Antwort ist oder für eine andere externe Anwendung bestimmt ist.

Die Verwaltung von logischen Kanälen ist für ein Betriebssystem des Datenträgers sehr aufwendig und benötigt eine große Menge an Speicher, umso mehr noch, wenn die Kommunikation unter gesicherten Bedingungen stattzufinden hat, also die zu einer Applikation gehörenden Daten verschlüsselt übertragen werden und allgemein gegen Ausspähen durch andere Applikationen geschützt werden.

Probleme treten auch in den Fällen auf, in denen mehrere, möglicherweise proprietäre Applikationen, die bisher jeweils als einzige Applikation auf einem eigenen Datenträger gespeichert waren, nun auf einem gemeinsamen, als Multiapplikationsdatenträger ausgebildeten Datenträger integriert werden sollen. Zu den oben erläuterten Schwierigkeiten in der parallelen Kommunikation kommt hinzu, dass Kollisionen in den Datenstrukturen stattfinden können, weil die verschiedenen Applikationen beispielsweise bisher verschiedene Inhalte auf verschiedenen Datenträgern mit identischen Dateibezeichnern FID (file identifier) bezeichnet haben, die nun auf dem gemeinsamen Datenträger nur noch eine Datei bezeichnen. Es kommt auch vor, dass Applikationen von verschiedenen Datenträgern zu integrieren sind, die verschiedenen Einschränkungen in den Kommunikationsparametern, wie beispielsweise der Blocklänge übertragbarer Blöcke, unterliegen.

Aufgabe der vorliegenden Erfindung ist es, ein Verfahren anzugeben, das die kontaktlose Kommunikation von einer Mehrzahl nicht aufeinander abgestimmter Applikationen eines tragbaren Datenträgers mit einem Lesegerät ermöglicht, sowie einen entsprechend eingerichteten Datenträger.

Diese Aufgabe wird durch ein Verfahren und einen Datenträger mit den Merkmalen der unabhängigen Ansprüche gelöst. In davon abhängigen Ansprüchen sind vorteilhafte Ausgestaltungen und Weiterbildungen angegeben.

Das vorliegende erfindungsgemäße Verfahren basiert auf dem Grundgedanken, dass für mindestens zwei auf einem tragbaren, kontaktlos kommunizierenden Datenträger befindliche Applikationen, die bereit sind, mit einem Lesegerät zu kommunizieren, ein erstes Kommunikationsbereitschaftssignal an das Lesegerät für eine erste der mindestens zwei Applikationen erzeugt wird, wobei das Signal eine erste Identifikationsnummer umfasst, die der ersten der mindestens zwei Applikationen zugeordnet ist und dem Lesegerät die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und ein zweites Kommunikationsbereitschaftssignal an das Lesegerät für eine zweite der mindestens zwei Applikationen erzeugt wird, wobei das zweite Signal eine von der ersten Identifikationsnummer verschiedene zweite Identifikationsnummer umfasst, die der zweiten Applikationen zugeordnet ist und dem Lesegerät die Kommunikationsbereitschaft dieser zweiten Applikation anzeigt. Diese Schritte werden von einer entsprechend eingerichteten Kommunikationseinrichtung auf dem Datenträger durchgeführt.

Die Identifikationsnummern übernehmen die Rolle, die im Stand der Technik der dem Datenträger zugeordneten Identifikationsnummer (UID, PUPI und dergleichen) zukommt. Somit kann das Lesegerät eine Applikation aus einer Mehrzahl von auf einem Datenträger befindlichen Applikationen gezielt und unabhängig vom Datenträger über die Identifikationsnummer ansprechen. Ein übliches Lesegerät hat dabei den Eindruck, mit unterschiedlichen Datenträgern zu kommunizieren.

Wenn im Folgenden von der Kommunikation einer Applikation A mit einem Lesegerät gesprochen wird, bedeutet dies immer die über eine Kommunikationseinrichtung des Datenträgers verlaufende Kommunikation, wobei das Lesegerät gezielt diese Applikation A anspricht und die an die Applikation A gerichteten Daten über die Kommunikationseinrichtung des Datenträgers an diese Applikation weitergeleitet werden, auch wenn sich auf dem Datenträger noch weitere kommunikationsbereite Applikationen B, C, ... , bereits schon mit dem Lesegerät in Kommunikation stehende Applikationen D, E, ... oder bereits durch das Lesegerät nach abgeschlossener Kommunikation suspendierte Applikationen F, G, ... befinden.

Die für die Applikationen erzeugten Signale des Datenträgers können z.B. periodisch ausgesendete Signale sein oder spezielle Antwortsignale auf vom Lesegerät ausgesendete Suchsignale. So kann das Lesegerät erkennen, welche kommunikationsbereiten Applikationen sich in seinem Ansprechfeld befinden, auch wenn diese auf einem gemeinsamen Datenträger gespeichert sind.

Eine vorhandene Umschaltfunktionalität des Datenträgers kann zwischen verschiedenen nebenläufig auf dem Datenträger ausgeführten Applikationen umschalten. Auf diese Weise können sich mehrere Applikationen quasi gleichzeitig mit dem Lesegerät in Kommunikation befinden, wobei das Umschalten zwischen diesen Applikationen deren parallele Kommunikation mit dem Lesegerät über die Kommunikationseinrichtung ermöglicht. Allerdings kann die Kommunikation, angepasst an die Fähigkeiten des Lesegeräts, anstatt parallel auch nacheinander stattfinden.

Die vorerwähnten Einschränkungen im Zusammenhang mit der Benutzung logischer Kanäle fallen weg. Es können mehr als vier Applikationen parallel mit dem Lesegerät kommunizieren. Die Kommunikationseinrichtung stellt sicher, dass alle Daten, die vom Lesegerät zum Datenträger gesendet werden, nur durch die angesprochene Applikation verarbeitet werden. Sie stellt insbesondere sicher, dass alle vom Datenträger zum Lesegerät ausgesendeten Daten so beschaffen sind, dass das Lesegerät sie eindeutig einer Applikation zuordnen kann.

Schließlich ergibt sich der Vorteil, dass eine Mehrzahl von Applikationen unabhängig voneinander und ohne aufeinander abgestimmt sein zu müssen, auf einem gemeinsamen Datenträger integriert werden können, da das Umschalten zwischen den Applikationen es erlaubt, dass jede der Applikationen über eigene Datenstrukturen, beispielsweise ein Dateisystem, und eigene Softwaremittel, wie beispielsweise nur von ihr genutzten Programmcode, verfügen kann. Kollisionen mit weiteren Applikationen bezüglich dieser Resourcen sind somit ausgeschlossen.

Die Umschaltfunktionalität kann als Bestandteil des Betriebssystems ausgebildet sein. Die Umschaltung zwischen verschiedenen Applikationen kann z.B. durch Verzweigen erfolgen. Beim Verzweigen wird von einem sogenannten Elternprozess, ein neuer Prozess, der Kindprozess, gestartet. Hierbei nutzen beide, Eltern- und Kindprozess, dieselben Systemresourcen, wie beispielsweise Arbeitsspeicher. Eine Umschaltung kann andererseits z.B. auch durch einen Kontextwechsel mittels eines Dispatchers erfolgen. Dabei erhält der jeweils aktuell dem Prozessor zugeordnete Prozess seinen eigenen Kontext, der beispielsweise Bereiche im Hauptspeicher und Systemvariablen umfasst.

Das Lesegerät wählt eine Applikation für die weitere Kommunikation mittels der der Applikation zugeordneten Identifikationsnummer aus. Einer für die weitere Kommunikation ausgewählten Applikation wird dann vom Lesegerät dynamisch eine Sitzungsnummer zugeordnet. Über diese Sitzungsnummer kann die Applikation während der Kommunikation mit dem Lesegerät eindeutig adressiert werden. Beim Adressieren wird die Sitzungsnummer im Datenträger durch die Kommunikationseinrichtung mit der der Applikation zugeordneten Identifikationsnummer so verknüpft, dass bei der Kommunikation immer die richtige Applikation angesprochen wird. Ist eine Applikation vom Lesegerät zur weiteren Kommunikation ausgewählt, so findet diese Kommunikation anschließend auch statt, ohne dass es weiterer Schritte bedarf. Eine vom Lesegerät zur weiteren Kommunikation ausgewählte Applikation befindet sich also dann in Kommunikation mit dem Lesegerät.

Verfahrensgemäß werden von dem Datenträger für eine oder mehrere auf dem Datenträger befindliche Applikationen, die vom Lesegerät noch nicht für die weitere Kommunikation ausgewählt worden sind, Kommunikationsbereitschaftssignale erzeugt, auch wenn bereits eine oder mehrere andere Applikationen vom Lesegerät für die weitere Kommunikation ausgewählt worden sind und die Kommunikation mit diesen anderen Applikationen noch nicht abgeschlossen ist. Dies ist vorzugsweise auch dann der Fall, nachdem bereits eine oder mehrere andere Applikationen vom Lesegerät nach abgeschlossener Kommunikation suspendiert worden sind. Eine weitere, von der Kommunikation mit dem Lesegerät losgelöste Aktivität der vom Lesegerät suspendierten Applikation auf dem Datenträger ist weiterhin möglich.

Während nach dem Stand der Technik ein in Kommunikation befindlicher Datenträger nicht auf Suchsignale antwortet und ein suspendierter Datenträ-

ger entweder erst aus dem Ansprechfeld des Lesegeräts entfernt werden muß, um durch erneutes Einbringen wieder kommunikationsbereit zu werden oder durch ein RESET-Signal des Lesegerätes zurückgesetzt wird, kann ein Lesegerät mit allen kommunikationsbereiten Applikationen des erfindungsgemäßen Datenträgers jederzeit Kontakt aufnehmen.

Die Kommunikationseinrichtung steuert die gesamte Kommunikation zwischen den Applikationen und dem Lesegerät und kennt stets den Kommunikationsstatus jeder Applikation: kommunikationsbereit oder zur weiteren Kommunikation vom Lesegerät ausgewählt und somit mit dem Lesegerät in Kommunikation oder vom Lesegerät nach abgeschlossener Kommunikation suspendiert.

Der Datenträger teilt dem Lesegerät vorzugsweise mittels Kollisionssignalen mit, dass noch kommunikationsbereite Applikationen, die noch nicht für eine weitere Kommunikation ausgewählt worden sind, im Ansprechfeld vorhanden sind. Diese Signale, die während der Ausführung des Kollisionsalgorithmus ausgesendet werden, können beispielsweise die Form von vorgetäuschten Kollisionen zwischen einer Mehrzahl von Applikationen annehmen. Das Lesegerät wird dann parallel zur Kommunikation mit anderen Applikationen und / oder nach Kommunikationsende Suchsignale aussenden, um mit den noch nicht zur Kommunikation ausgewählten Applikationen Kontakt aufzunehmen.

Vorzugsweise speichert das Verfahren mittels der Kommunikationseinrichtung in einem nichtflüchtigem Speicher Information darüber, welche der Applikationen zuletzt vom Lesegerät für die weitere Kommunikation ausgewählt worden ist. Damit kann bei erneuter Aktivierung des Datenträgers, beispielsweise nach einer Unterbrechung der Energiezufuhr, festgestellt

werden, welche Applikation zuletzt mit dem Lesegerät kommuniziert hat, um dann zunächst für eine davon verschiedene Applikation ein Kommunikationsbereitschaftssignal zu erzeugen, um z.B. zu verhindern, dass immer dieselbe Applikation zuerst zum Zuge kommt und andere Applikationen möglicherweise lange Wartezeiten in Kauf nehmen müssen oder gar nicht erst zur Ausführung kommen.

Das Verfahren kann daher so gestaltet werden, dass das Lesegerät mit mehreren Applikationen parallel kommunizieren kann. Dabei werden die den Applikationen zugeordneten Identifikationsnummern vorzugsweise so gewählt, dass das Lesegerät sie wie Identifikationsnummern von unterschiedlichen Datenträgern interpretiert. Dann kann das erfindungsgemäße Verfahren problemlos mit Lesegeräten nach dem Stand der Technik durchgeführt werden.

Der erfindungsgemäße Datenträger kann als kontaktlos kommunizierende Chipkarte, kontaktlos kommunizierendes Label oder kontaktlos kommunizierendes Ausweisdokument ausgebildet sein. Weiterhin ist es möglich, dass der Datenträger als Sicherheitsmodul SAM (secure application module) in einem Gerät, das zur kontaktlosen Datenübertragung eingerichtet ist, ausgebildet ist, wobei das Sicherheitsmodul über Softwaremittel verfügt, um mittels einer geeigneten Schnittstelle mit Hilfe des Geräts kontaktlos zu kommunizieren. Ein SAM ist ein sowohl mechanisch als auch softwaretechnisch abgesichertes Bauteil, das zur Aufbewahrung von geheimen Daten und zum Ausführen von Kryptoalgorithmen dient.

Nachfolgend wird die Erfindung anhand der begleitenden Zeichnungen beispielhaft erläutert. Darin zeigen:

Figur 1 einen schematisch dargestellten erfindungsgemäßen Datenträger;

Figur 2 ein Flussdiagramm eines Ablaufs einer ersten Ausführungsform des erfindungsgemäßen Verfahrens; und

Figur 3 ein Flussdiagramm eines Ablaufs einer zweiten Ausführungsform des erfindungsgemäßen Verfahrens.

Verschiedene Ausführungsformen der Erfindung werden im Folgenden genauer dargestellt. Figur 1 zeigt schematisch einen erfindungsgemäßen Datenträger 100 und ein Lesegerät 200. Auf dem Datenträger 100 befinden sich mindestens zwei Applikationen 10, 20, 30. Der Datenträger 100 umfasst eine Kommunikationseinrichtung 70 und eine Umschalteinrichtung 50, die eingerichtet ist, zwischen den verschiedenen Applikationen 10, 20, 30 umzuschalten. Jeder der Applikationen 10, 20, 30 ist eine Identifikationsnummer UID1, UID2, UIDn zugeordnet. Die Identifikationsnummern UID1, UID2, UIDn werden von der Kommunikationseinrichtung 70 verwaltet. Tritt das Lesegerät 200 in Kommunikation mit einer oder mehreren der Applikationen 10, 20, 30 des Datenträgers 100, so kann das Lesegerät diese über die Identifikationsnummern UID1, UID2, UIDn zur weiteren Kommunikation auswählen und mittels von ihm dynamisch vergebenen Sitzungsnummern CID1, CID2, CIDn im weiteren Verlauf der Kommunikation adressieren. Diese Sitzungsnummern CID1, CID2, CIDn können von der Kommunikationseinrichtung 70 mit den Identifikationsnummern der jeweils adressierten Applikationen verknüpft werden. Jegliche Kommunikation zwischen den Applikationen 10, 20, 30 des Datenträgers 100 mit dem Lesegerät 200 verläuft über die Kommunikationseinrichtung 70, wobei zwischen den Applikationen 10, 20, 30 mittels der Umschalteinrichtung 50 umgeschaltet werden kann.

Figur 2 zeigt ein Flussdiagramm eines Ablaufs einer ersten Ausführungsform des erfindungsgemäßen Verfahrens. Die Ziffern bezeichnen einzelne Verfahrensschritte und Zustände einzelner Komponenten. Gelangt der erfindungsgemäße Datenträger 100, der sich zu Beginn in nicht betriebsbereitem Zustand befindet 0, in das Ansprechfeld eines Lesegerätes 200, wird er betriebsbereit 1000 und empfängt vom Lesegerät 200 ein Suchsignal 300. Die Kommunikationseinrichtung 70 des Datenträgers 100 erzeugt für eine erste Applikation 10 ein Kommunikationsbereitschaftssignal, das die der Applikation 10 zugeordnete Identifikationsnummer UID1 umfasst 1010. Dieses Signal wird vom Datenträger ausgesendet, und die Applikation 10 wird im Laufe des Selektionsprozesses 400 mittels eines Antikollisionsverfahrens vom Lesegerät 200 für die weitere Kommunikation ausgewählt.

Während oder bevor das Lesegerät 200 mit der Applikation 10 des Datenträgers 100 kommuniziert 2010, welche sie über die Sitzungsnummer CID1 adressiert 510, sendet es weitere Suchsignale 300 aus und die Kommunikationseinrichtung 70 des Datenträgers 100 erzeugt für eine zweite Applikation 20 ein die Identifikationsnummer UID2 umfassendes Kommunikationsbereitschaftssignal 1020 und die Applikation 20 wird im Laufe des Selektionsprozesses 400 vom Lesegerät 200 für die weitere Kommunikation ausgewählt. Das Lesegerät 200 befindet sich nun parallel in Kommunikation mit den beiden Applikationen 10 und 20, 2010, 2020, die über die Sitzungsnummern CID1 510 bzw. CID2 adressiert werden 520.

Analog folgt die Kommunikationsaufnahme des Lesegeräts 200 mit der Applikation 30 durch ein Suchsignal 300, ein von der Kommunikationseinrichtung 70 erzeugtes Kommunikationsbereitschaftssignal 1030, einen Selektionsschritt 400, womit schließlich das Lesegerät 200 mit den drei über die Sitzungsnummern CID1, CID2, CIDn adressierten Applikationen 10, 20, 30, 510,

520, 530 parallel in Kommunikation ist 2010, 2020, 2030. Wie angedeutet, kann sich das Verfahren in gleicher Weise noch mit weiteren Applikationen fortsetzen.

Für das Lesegerät 200 erscheinen die verschiedenen Applikationen des erfindungsgemäßen Datenträgers 100 als eine Ansammlung verschiedener Datenträger nach dem Stand der Technik.

Figur 3 zeigt ein Flussdiagramm eines Ablaufs einer zweiten Ausführungsform des erfindungsgemäßen Verfahrens. Die Ziffern bezeichnen wie in Figur 2 einzelne Verfahrensschritte und Zustände einzelner Komponenten. Hauptunterschied zu der in Figur 2 dargestellten Ausführungsform ist, dass im gegenwärtigen Beispiel das Lesegerät nicht mit mehreren Applikationen mittels verschiedene Sitzungsnummern gleichzeitig kommuniziert, sondern mit verschiedenen Applikationen nacheinander.

Schritte und Zustände, die gleich sind zu denen in Figur 2, werden gleich bezeichnet und nicht erneut erklärt. Nach Aussenden eines Suchsignals 300 durch das Lesegerät 200 erzeugt die Kommunikationseinrichtung 70 des Datenträgers 100 für eine erste Applikation 10 ein Kommunikationsbereitschaftssignal, das die der Applikation zugeordnete Identifikationsnummer UID1 1010 umfasst und die Applikation 10 wird im Laufe des Selektionsprozesses 400 mittels eines Antikollisionsverfahrens vom Lesegerät 200 für die weitere Kommunikation ausgewählt. Das Lesegerät 200 befindet sich in Kommunikation 2000 mit der Applikation 10, 610, und schließt diese Kommunikation auch ab, bevor es neue Suchsignale aussendet. Davor muss die Applikation 10 suspendiert werden 700, beispielsweise mittels eines DESELCT-Kommandos, wobei der erfindungsgemäße Datenträger weiterhin betriebsbereit 1000 bleibt, und damit auf das nächste Suchsignal 300 des Le-

segeräts 200 mit einem für eine zweite Applikation 20 erzeugten Kommunikationsbereitschaftssignal, welches die der Applikation 20 zugeordnete Identifikationsnummer UID2 umfasst, antworten kann. Ein analoger Prozess kann sich nun sequentiell für alle auf dem Datenträger befindlichen Applikationen anschließen. In Figur 3 ist noch die Kommunikation des Lesegerätes mit den Applikationen 20 und 30 dargestellt 620, 630.

Eine weitere Möglichkeit, dem Lesegerät anzuzeigen, dass sich noch kommunikationsbereite Applikationen im Ansprechfeld befinden, besitzt der erfindungsgemäßen Datenträger 100 dadurch, dass die Kommunikationseinrichtung 70 während des Ablaufs eines Antikollisionsverfahrens 400 Signale aussenden kann, die dem Lesegerät die Kollision von wenigstens zwei Datenträgern vortäuschen. Das Lesegerät wird dann zu einem späteren Zeitpunkt versuchen, Kontakt zu solchen Applikationen aufzunehmen. Bei dem zum Vortäuschen einer Kollision ausgesendeten Signal oder Datenmuster kann es sich z.B. um eine Codeverletzung (z.B. ISO 14443 Typ A: Manchester Code bei gleichzeitigem Senden einer "0" und einer "1") oder um einen Prüfsummenfehler handeln. Bei Antikollisionsverfahren mit mehreren Zeitschlitzen (z.B. ISO 14443 Typ B: Slotted Aloha Verfahren) können in unterschiedlichen Zeitschlitzen die verschiedenen Identifikationsnummern UID1, UID2, UIDn der auf dem Datenträger befindlichen Applikationen ausgesendet werden, um dem Lesegerät die Anwesenheit entsprechender Datenträger vorzutäuschen.

Für das Lesegerät 200 besteht auch die Möglichkeit, das Magnetfeld kurzzeitig abzuschalten um dann, falls es sich um Datenträger ohne eigene Energieversorgung handelt, nach deren Neustart (Power-On Reset) einen neuen Datenträger im Ansprechfeld auszuwählen. Erfindungsgemäß kann die Kommunikationseinrichtung 70 des Datenträgers 100 eingerichtet sein, in einem

nichtflüchtigen Speicher des Datenträgers 100 Information darüber zu speichern, welche der Applikationen 10, 20, 30 zuletzt mit dem Lesegerät 200 kommuniziert hat, um dann zunächst für eine davon verschiedene Applikation ein Kommunikationsbereitschaftssignal zu erzeugen, um z.B. zu verhindern, dass immer dieselbe Applikation zuerst zum Zuge kommt und andere Applikationen möglicherweise lange Wartezeiten in Kauf nehmen müssen oder gar nicht erst zur Ausführung kommen.

Patentansprüche

1. Verfahren zur kontaktlosen Kommunikation eines Lesegeräts (200) mit mindestens zwei auf einem tragbaren Datenträger (100) befindlichen kommunikationsbereiten Applikationen (10, 20, 30), **gekennzeichnet durch** die Schritte:

Erzeugen eines ersten Kommunikationsbereitschaftssignals an das Lesegerät (200) für eine erste der mindestens zwei Applikationen (10, 20, 30), wobei das Signal eine erste Identifikationsnummer umfasst, die der ersten der mindestens zwei Applikationen (10, 20, 30) zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und

Erzeugen eines zweiten Kommunikationsbereitschaftssignals an das Lesegerät (200) für eine zweite der mindestens zwei Applikationen (10, 20, 30), wobei das zweite Signal eine von der ersten Identifikationsnummer verschiedene zweite Identifikationsnummer umfasst, die dieser zweiten Applikation zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser zweiten Applikation anzeigt.

2. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet**, dass das Lesegerät (200) Suchsignale aussendet, wobei die für die Applikationen (10, 20, 30) erzeugten Signale Antwortsignale auf die Suchsignale sind.

3. Verfahren gemäß Anspruch 1 oder 2, **gekennzeichnet durch** den weiteren Schritt des Umschaltens zwischen den Applikationen (10, 20, 30) zur Kommunikation der Applikation (10, 20, 30) mit einem Lesegerät (200).

4. Verfahren gemäß Anspruch 3, **dadurch gekennzeichnet**, dass das Umschalten durch Verzweigen oder durch Kontextwechsel erfolgt.

5. Verfahren gemäß einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet,** dass das Lesegerät (200) eine oder mehrere der mindestens zwei Applikationen (10, 20, 30) über die den Applikationen (10, 20, 30) zugeordneten Identifikationsnummern für die weitere Kommunikation auswählt.

6. Verfahren gemäß Anspruch 5, **dadurch gekennzeichnet,** dass für eine oder mehrere der mindestens zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, das Kommunikationsbereitschaftssignal erzeugt wird, während die Kommunikation mit einer oder mehreren anderen der mindestens zwei Applikationen (10, 20, 30), die vom Lesegerät (200) für die weitere Kommunikation ausgewählt worden sind, noch nicht abgeschlossen ist.

7. Verfahren gemäß Anspruch 5 oder 6, **dadurch gekennzeichnet,** dass für eine oder mehrere der mindestens zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, das Kommunikationsbereitschaftssignal erzeugt wird, nachdem eine oder mehrere andere der mindestens zwei Applikationen (10, 20, 30) nach abgeschlossener Kommunikation mit dem Lesegerät (200) suspendiert worden sind.

8. Verfahren gemäß einem der Ansprüche 5 bis 7, **dadurch gekennzeichnet,** dass der Datenträger (100) dem Lesegerät (200) mittels Kollisionssignalen mitteilt, dass eine oder mehrere der mindestens zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, vorhanden sind, indem Signale gesendet werden, die eine Kollisionen zwischen einer Mehrzahl von Applikationen (10, 20, 30) vortäuschen.

9. Verfahren gemäß einem der Ansprüche 5 bis 7, **dadurch gekennzeichnet**, dass der Datenträger (100) dem Lesegerät (200) mittels einer Belegung von ein oder mehreren Zeitschlitzen mitteilt, dass eine oder mehrere der mindestens zwei Applikationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, vorhanden sind.

10. Verfahren gemäß einem der Ansprüche 5 bis 9, **gekennzeichnet durch** den weiteren Schritt des Speicherns von Information in einem nichtflüchtigen Speicher des Datenträgers (100) darüber, welche der mindestens zwei Applikationen (10, 20, 30) zuletzt von dem Lesegerät (200) für die weitere Kommunikation ausgewählt worden ist.

11. Verfahren gemäß einem der Ansprüche 5 bis 9, **gekennzeichnet durch** den weiteren Schritt des Speicherns von Information in einem nichtflüchtigen Speicher des Datenträgers (100) darüber, welche der mindestens zwei Applikationen (10, 20, 30) eine aktive Kommunikation mit dem Lesegerät (200) bereits abgeschlossen hat.

12. Verfahren gemäß Anspruch 10 oder 11, **dadurch gekennzeichnet**, dass bei erneuter Kommunikation des Lesegeräts (200) mit dem Datenträger (100) zunächst für eine der mindestens zwei Applikationen (10, 20, 30), die verschieden ist von der durch die gespeicherte Information bezeichneten Applikation (10, 20, 30), ein Kommunikationsbereitschaftssignal ausgesendet wird.

13. Verfahren gemäß Anspruch 10 oder 11, **dadurch gekennzeichnet**, dass bei erneuter Kommunikation des Lesegeräts (200) mit dem Datenträger

(100) zunächst für die Applikation (10, 20, 30), mit der zuletzt aktiv kommuniziert wurde, ein Kommunikationsbereitschaftssignal ausgesendet wird.

14. Verfahren gemäß einem der Ansprüche 5 bis 13, **dadurch gekennzeichnet,** dass das Lesegerät (200) eine für die weitere Kommunikation ausgewählte Applikation (10, 20, 30) über eine dynamisch vergebene Sitzungsnummer adressiert.

15. Verfahren gemäß Anspruch 14, **dadurch gekennzeichnet,** dass beim Adressieren die Sitzungsnummer auf dem Datenträger (100) mit der der Applikation (10, 20, 30) zugeordneten Identifikationsnummer verknüpft wird.

16. Verfahren gemäß einem der Ansprüche 1 bis 15, **dadurch gekennzeichnet,** dass das Lesegerät (200) mit mehreren der mindestens zwei Applikationen (10, 20, 30) parallel kommuniziert.

17. Verfahren gemäß einem der Ansprüche 1 bis 16, **dadurch gekennzeichnet,** dass das Lesegerät (200) die Identifikationsnummern als Identifikationsnummern unterschiedlicher Datenträger interpretiert.

18. Kontaktlos kommunizierender tragbarer Datenträger (100), umfassend mindestens zwei darauf gespeicherte Applikationen (10, 20, 30) und eine Kommunikationseinrichtung (70) zum Steuern einer Kommunikation zwischen einem Lesegerät (200) und den mindestens zwei Applikationen (10, 20, 30), **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, Kommunikationsbereitschaftssignale an das Lesegerät (200) zu erzeugen, die jeweils dem Lesegerät (200) eine Kommunikationsbereitschaft für eine der Applikationen (10, 20, 30) anzeigen und eine der entspre-

chenden kommunikationsbereiten Applikation (10, 20, 30) zugeordnete Identifikationsnummer umfassen.

19. Datenträger (100) gemäß Anspruch 18, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, die Kommunikationsbereitschaftssignale als Antwortsignale auf vom Datenträger empfangene Suchsignale zu erzeugen.

20. Datenträger (100) gemäß Anspruch 18 oder 19, **gekennzeichnet durch** eine Umschalteinrichtung (50), die eingerichtet ist, zur Kommunikation der Applikationen (10, 20, 30) mit einem Lesegerät (200) zwischen den Applikationen (10, 20, 30) des Datenträgers (100) umzuschalten.

21. Datenträger (100) gemäß Anspruch 20, **dadurch gekennzeichnet,** dass die Umschalteinrichtung (50) eingerichtet ist, zwischen den Applikationen (10, 20, 30) des Datenträgers (100) mittels Verzweigens oder Kontextwechsels umzuschalten.

22. Datenträger (100) gemäß einem der Ansprüche 18 bis 21, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, die Kommunikation zwischen einem Lesegerät (200) und einer von dem Lesegerät (200) über eine Sitzungsnummer adressierten Applikation (10, 20, 30) herzustellen.

23. Datenträger (100) gemäß Anspruch 22, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, beim Adressieren der Applikation (10, 20, 30) die Sitzungsnummer mit der der Applikation (10, 20, 30) zugeordneten Identifikationsnummer zu verknüpfen.

24. Datenträger (100) gemäß einem der Ansprüche 18 bis 23, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, diejenigen Applikationen (10, 20, 30) aus den mindestens zwei Applikationen (10, 20, 30) zu ermitteln, die zur Kommunikation mit einem Lesegerät (200) bereit sind.

25. Datenträger (100) gemäß Anspruch 24, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, für eine oder mehrere der mindestens zwei Applikationen (10, 20, 30), die zur Kommunikation mit einem Lesegerät (200) bereit sind und noch nicht mit einem Lesegerät (200) kommunizieren, Kommunikationsbereitschaftssignale auszusenden, während die Kommunikation mit einer oder mehreren anderen der mindestens zwei Applikationen (10, 20, 30) noch nicht abgeschlossen ist.

26. Datenträger (100) gemäß Anspruch 24 oder 25, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, für eine oder mehrere der mindestens zwei Applikationen (10, 20, 30), die zur Kommunikation mit einem Lesegerät (200) bereit sind und noch nicht mit einem Lesegerät (200) kommunizieren, Kommunikationsbereitschaftssignale auszusenden, nachdem eine oder mehrere andere der mindestens zwei Applikationen (10, 20, 30) nach abgeschlossener Kommunikation mit einem Lesegerät (200) suspendiert worden sind.

27. Datenträger (100) gemäß einem der Ansprüche 18 bis 26, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, dem Lesegerät (200) über Kollisionssignale, die eine Kollision zwischen einer Mehrzahl von Applikationen vortäuschen, mitzuteilen, dass noch eine oder mehrere der mindestens zwei auf dem Datenträger (100) befindlichen Appli-

kationen (10, 20, 30), die vom Lesegerät (200) noch nicht für die weitere Kommunikation ausgewählt worden sind, vorhanden sind.

28. Datenträger (100) gemäß einem der Ansprüche 18 bis 27, **dadurch gekennzeichnet,** dass die Kommunikationseinrichtung (70) eingerichtet ist, in einem nichtflüchtigen Speicher des Datenträgers (100) Informationen darüber zu speichern, welche der mindestens zwei Applikationen (10, 20, 30) zuletzt mit einem Lesegerät (200) kommuniziert hat.

29. Datenträger (100) gemäß Anspruch 28, **dadurch gekennzeichnet**, dass die Kommunikationseinrichtung (70) eingerichtet ist, bei erneuter Kontaktaufnahme eines Lesegeräts (200) zum Datenträger (100) zunächst für eine der mindestens zwei Applikationen (10, 20, 30), die verschieden ist von der durch die gespeicherte Information bezeichneten Applikation (10, 20, 30), ein Kommunikationsbereitschaftssignal auszusenden.

30. Datenträger (100) gemäß einem der Ansprüche 18 bis 29, **dadurch gekennzeichnet,** dass der Datenträger (100) als kontaktlos kommunizierende Chipkarte, kontaktlos kommunizierendes Label, kontaktlos kommunizierendes Ausweisdokument oder als eine SIM-Karte ausgebildet ist.

31. Datenträger (100) gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, dass der Datenträger ein Dual-Interface aufweist und sowohl kontaktlos als auch kontaktbehaftet betrieben werden kann.

32. Datenträger (100) gemäß einem der Ansprüche 18 bis 31, **dadurch gekennzeichnet,** dass der Datenträger (100) als Sicherheitsmodul in einem Gerät, das Kommunikationsmittel zur kontaktlosen Kommunikation umfasst,

ausgebildet ist, wobei das Sicherheitsmodul über Softwaremittel verfügt, um über die Kommunikationsmittel des Geräts kontaktlos zu kommunizieren.

Zusammenfassung

Die vorliegende Erfindung betrifft ein Verfahren und einen entsprechend eingerichteten Datenträger zur kontaktlosen, insbesondere parallelen, Kommunikation eines Lesegeräts (200) mit mindestens zwei auf einem tragbaren Datenträger (100) befindlichen kommunikationsbereiten Applikationen (10, 20, 30). Dabei wird ein erstes Kommunikationsbereitschaftssignal für eine erste Applikation (10, 20, 30) erzeugt und an das Lesegerät (200) gesendet, wobei das Signal eine erste Identifikationsnummer umfasst, die der ersten Applikation (10, 20, 30) zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser ersten Applikation anzeigt, und ein zweites Kommunikationsbereitschaftssignal für eine zweite Applikation (10, 20, 30) erzeugt und gesendet, wobei das zweite Signal eine von der ersten Identifikationsnummer verschiedene zweite Identifikationsnummer umfasst, die dieser zweiten Applikation zugeordnet ist und dem Lesegerät (200) die Kommunikationsbereitschaft dieser zweiten Applikation anzeigt. Die Identifikationsnummern täuschen dabei dem Lesegerät jeweils die Kommunikationsbereitschaft eines Datenträgers vor. Das Lesegerät hat dadurch den Eindruck, mit Applikationen von zwei separaten Datenträgern zu kommunizieren.

FIG 1

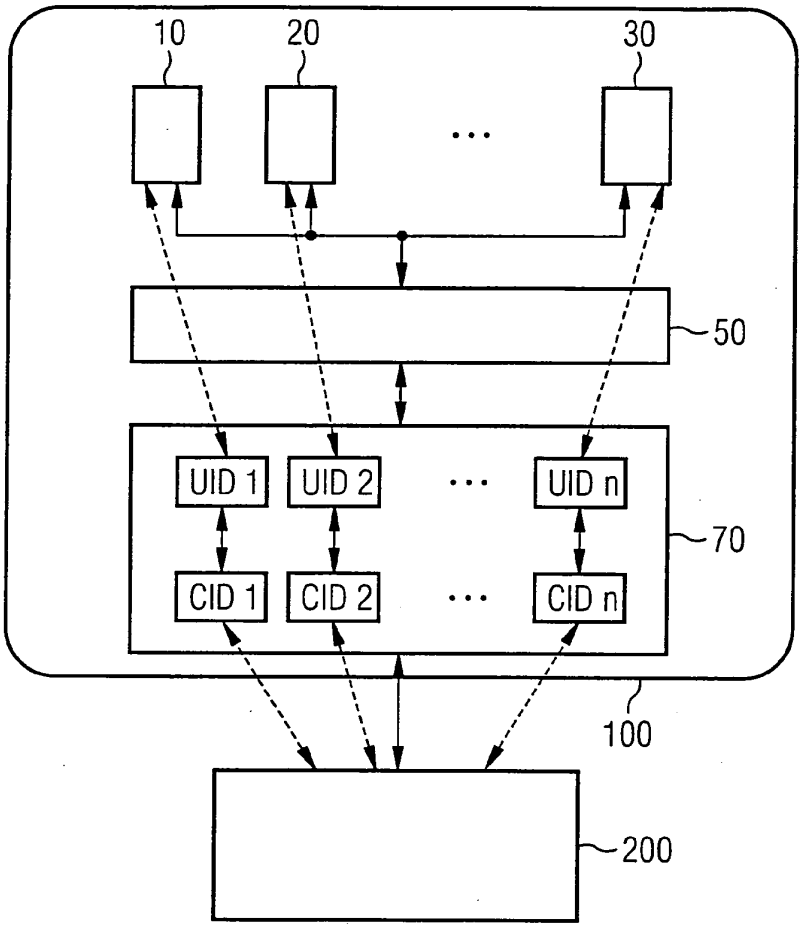


FIG 2

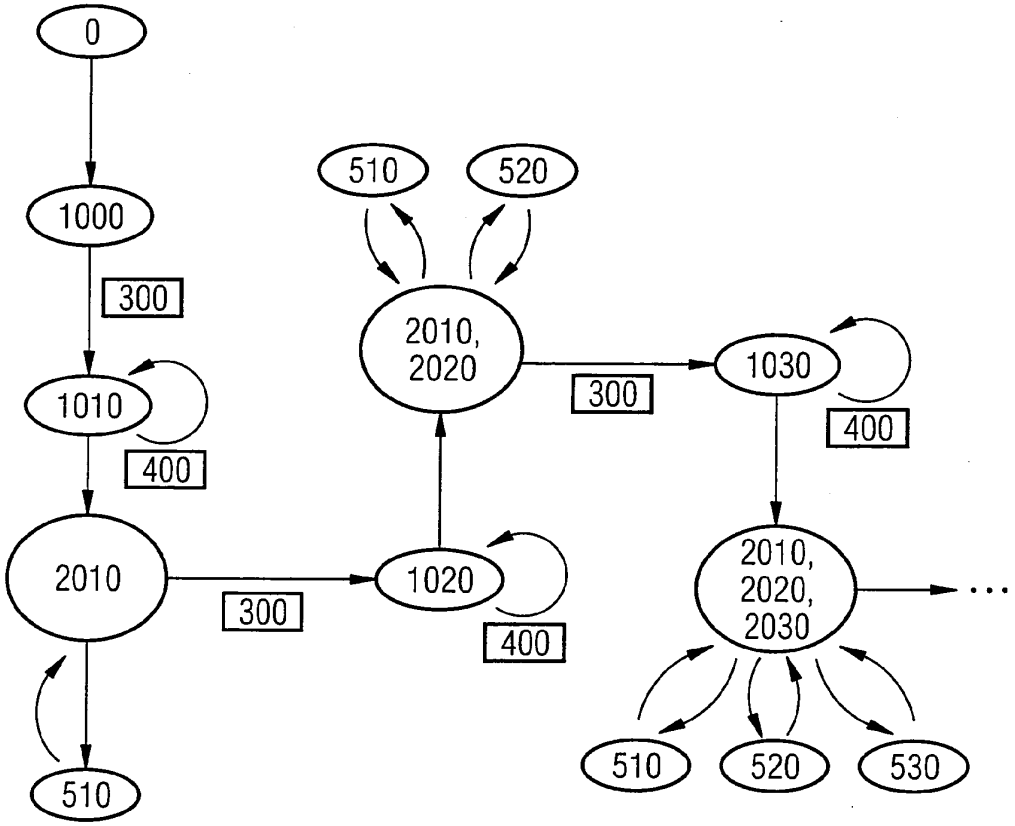

0
1000
300
1010
400
2010
300
510
1020
400
510
520
2010,
2020
300
1030
400
2010,
2020,
2030
...
510
520
530

FIG 3

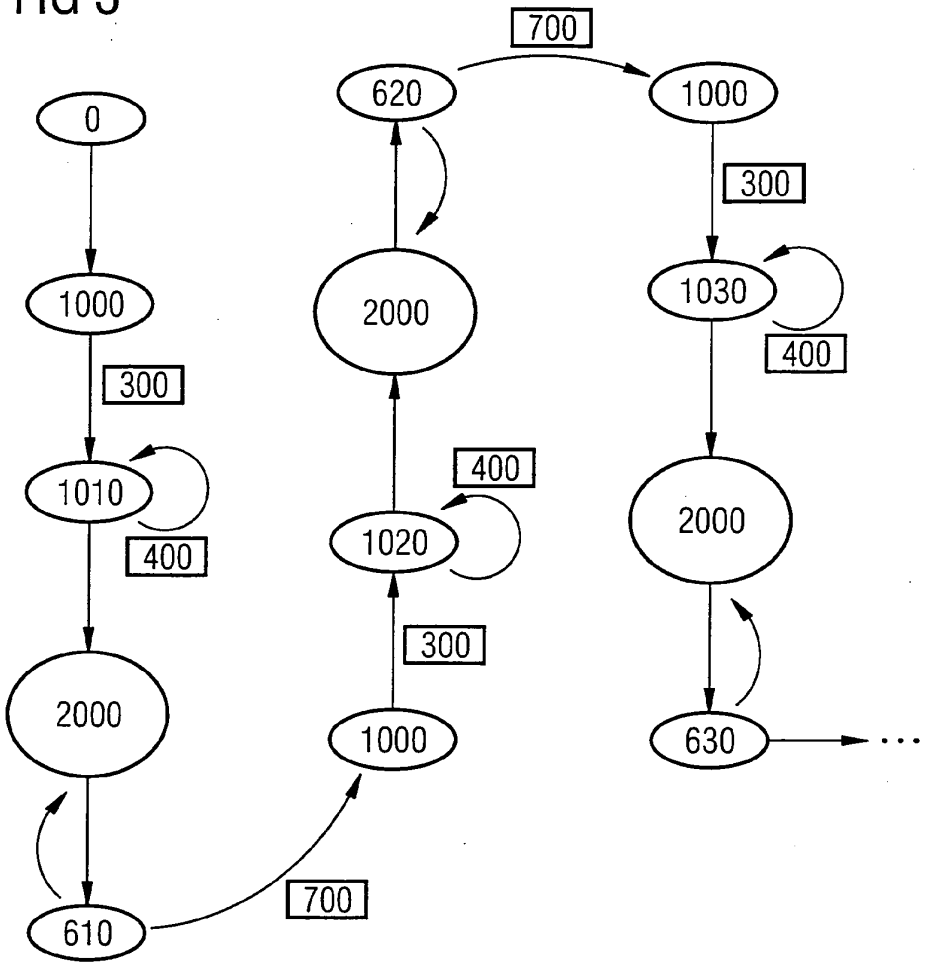
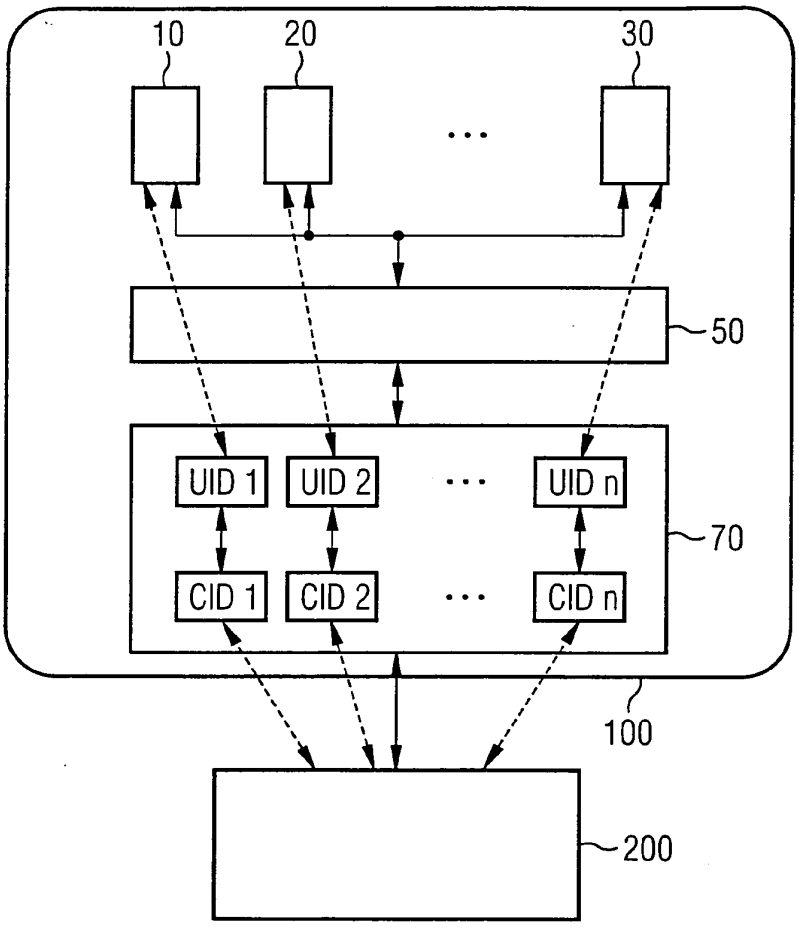

0
1000
300
1010
400
2000
610
700
1000
2000
400
1020
300
620
700
1000
300
1030
400
2000
630

FIG 1



Blatt Nr. ...5...

Feld Nr. VIII (iii) ERKLÄRUNG: BERECHTIGUNG, DIE PRIORITÄT EINER FRÜHEREN ANMELDUNG ZU BEANSPRUCHEN

Die Erklärung muß dem in Abschnitt 213 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (iii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

Erklärung hinsichtlich der Berechtigung des Anmelders, zum Zeitpunkt des internationalen Anmeldedatums, die Priorität der unten aufgeführten früheren Anmeldung zu beanspruchen, in Fällen, in denen der Anmelder nicht auch der Anmelder der früheren Anmeldung ist, oder in Fällen, in denen sich der Name des Anmelders seit der Einreichung der früheren Anmeldung geändert hat (Regeln 4.17 Ziffer iii und 51*bis*.1 Absatz a Ziffer iii):

Im Bezug auf die internationale Patentanmeldung:

"Datenträger und Verfahren zur kontaktlosen Kommunikation zwischen dem Datenträger und einem Lesegerät"

FINKENZELLER, Klaus und HARTEL, Karl Eglof sind kraft nachfolgend Aufgeführten berechtigt, die Priorität der früheren Anmeldung

Nr. 10 2006 027 200.5

zu beanspruchen:

die Anmelder sind die Erfinder des Gegenstands, für den um Schutz im Wege der früheren Anmeldung nachgesucht wurde.

☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (iii)".

Feld Nr. VIII (ii) ERKLÄRUNG: BERECHTIGUNG, EIN PATENT ZU BEANTRAGEN UND ZU ERHALTEN

Die Erklärung muß dem in Abschnitt 212 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (ii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

Erklärung hinsichtlich der Berechtigung des Anmelders, zum Zeitpunkt des internationalen Anmeldedatums, ein Patent zu beantragen und zu erhalten (Regeln 4.17 Ziffer ii und 51*bis*.1 Absatz a Ziffer ii), für den Fall, daß eine Erklärung nach Regel 4.17 Ziffer iv nicht einschlägig ist:

In Bezug auf die internationale Patentannmeldung:

"Datenträger und Verfahren zur kontaktlosen Kommunikation zwischen dem Datenträger und einem Lesegerät"

Giesecke & Devrient GmbH ist kraft des nachfolgend Aufgeführten berechtigt, ein Patent zu beantragen und zu erhalten:

Giesecke & Devrient GmbH ist berechtigt, als Arbeitgeber der Erfinder FINKENZELLER, Klaus, HARTEL, Karl Eglof und BRANDL, Denny

☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (ii)".

Feld Nr. VIII (iv) ERKLÄRUNG: ERFINDERERKLÄRUNG (nur im Hinblick auf die Bestimmung der Vereinigten Staaten von Amerika)

Die Erklärung muß dem in Abschnitt 214 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (iv). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

Erfindererklärung (Regeln 4.17 Ziffer iv und 51bis.1 Absatz a Ziffer iv) im Hinblick auf die Bestimmung der Vereinigten Staaten von Amerika:

Ich erkläre hiermit an Eides Statt, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Erfinder angegeben ist) oder Miterfinder (falls nachstehend mehr als ein Erfinder angegeben ist) des beanspruchten Gegenstandes bin, für den ein Patent beantragt wird.

Diese Erklärung wird im Hinblick auf und als Teil dieser internationalen Anmeldung abgegeben (falls die Erklärung zusammen mit der Anmeldung eingereicht wird).

Diese Erklärung wird im Hinblick auf die internationale Anmeldung Nr. PCT/..... abgegeben (falls diese Erklärung nach Regel 26*ter* eingereicht wird).

Ich erkläre hiermit an Eides Statt, daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den neben meinem Namen aufgeführten Angaben entsprechen.

Ich bestätige hiermit, daß ich den Inhalt der oben angegebenen internationalen Anmeldung, einschließlich ihrer Ansprüche, durchgesehen und verstanden habe. Ich habe im Antragsformular dieser internationalen Anmeldung gemäß PCT Regel 4.10 sämtliche Auslandsanmeldungen angegeben und habe nachstehend unter der Überschrift "Frühere Anmeldungen", unter Angabe des Aktenzeichens, des Staates oder Mitglieds der Welthandelsorganisation, des Tages, Monats und Jahres der Anmeldung, sämtliche Anmeldungen für ein Patent bzw. eine Erfinderurkunde in einem anderen Staat als den Vereinigten Staaten von Amerika angegeben, einschließlich aller internationalen PCT-Anmeldungen, die wenigstens ein anderes Land als die Vereinigten Staaten von Amerika bestimmen, deren Anmeldetag dem der Anmeldung, deren Priorität beansprucht wird, vorangeht.

Frühere Anmeldungen: .....

.....

Ich erkenne hiermit meine Pflicht zur Offenbarung jeglicher Informationen an, die nach meinem Wissen zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind, einschließlich, im Hinblick auf Teilfortsetzungsanmeldungen, Informationen, die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem internationalen PCT-Anmeldedatum der Teilfortsetzungsanmeldung bekannt geworden sind.

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner, daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Codes strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

Name: FINKENZELLER, Klaus

Wohnsitz: 85774 Unterföhring, Deutschland
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Postanschrift: Ahornstraße 19
85774 Unterföhring, Deutschland

Staatsangehörigkeit: deutsch

Unterschrift des Erfinders: Klaus Finkenzeller Datum: 2007-06-14
(Die Unterschrift muß die des Erfinders sein, nicht die des Anwalts)

Name: HARTEL, Karl Eglof

Wohnsitz: 80689 München, Deutschland
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Postanschrift: Reutterstraße 74
80689 München, Deutschland

Staatsangehörigkeit: deutsch

Unterschrift des Erfinders: Karl E. Hartel Datum: 28 June 2007
(Die Unterschrift muß die des Erfinders sein, nicht die des Anwalts)

☒ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (iv)".

Fortsetzungsblatt für Felder VIII (i) bis (v) ERKLÄRUNG

Falls der Platz in einem der Felder VIII (i) bis (v) nicht für alle Angaben ausreicht, insbesondere im Falle, daß mehr als zwei Erfinder in Feld Nr. VIII (iv) aufgeführt werden: schreiben Sie "Fortsetzung von Feld Nr. VIII ..." (geben Sie die Ziffer des Feldes an) und machen Sie die erforderlichen Angaben entsprechend der in dem Feld, in dem der Platz nicht ausreicht, vorgeschriebenen Art und Weise. Falls hinsichtlich zweier oder mehr Erklärungen der Platz nicht ausreicht, sollten Sie jeweils ein separates Fortsetzungsblatt für jede Erklärung einreichen. Wird dieses Fortsetzungsblatt nicht benutzt, so sollte es dem Antrag nicht beigefügt werden.

Fortsetzung für Feld Nr. VIII (iv):

Name: BRANDL, Denny
Wohnsitz: 85386 Eching, Deutschland
Postanschrift: Pater-Rupert-Mayer-Straße 3e
85386 München, Deutschland
Staatsangehörigkeit: deutsch

Unterschrift des Erfinders: ..... Datum: 2007-06-29

Feld Nr. VIII (iii) **ERKLÄRUNG: BERECHTIGUNG, DIE PRIORITÄT EINER FRÜHEREN ANMELDUNG ZU BEANSPRUCHEN**

Die Erklärung muß dem in Abschnitt 213 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (iii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

Erklärung hinsichtlich der Berechtigung des Anmelders, zum Zeitpunkt des internationalen Anmeldedatums, die Priorität der unten aufgeführten früheren Anmeldung zu beanspruchen, in Fällen, in denen der Anmelder nicht auch der Anmelder der früheren Anmeldung ist, oder in Fällen, in denen sich der Name des Anmelders seit der Einreichung der früheren Anmeldung geändert hat (Regeln 4.17 Ziffer iii und 51*bis*.1 Absatz a Ziffer iii):

Im Bezug auf die internationale Patentanmeldung:

"Datenträger und Verfahren zur kontaktlosen Kommunikation zwischen dem Datenträger und einem Lesegerät"

FINKENZELLER, Klaus und HARTEL, Karl Eglof sind kraft nachfolgend Aufgeführten berechtigt, die Priorität der früheren Anmeldung

Nr. 10 2006 027 200.5

zu beanspruchen:

die Anmelder sind die Erfinder des Gegenstands, für den um Schutz im Wege der früheren Anmeldung nachgesucht wurde.

☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (iii)".

Feld Nr. VIII (ii) ERKLÄRUNG: BERECHTIGUNG, EIN PATENT ZU BEANTRAGEN UND ZU ERHALTEN

Die Erklärung muß dem in Abschnitt 212 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (ii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

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Giesecke & Devrient GmbH ist kraft des nachfolgend Aufgeführten berechtigt, ein Patent zu beantragen und zu erhalten:

Giesecke & Devrient GmbH ist berechtigt, als Arbeitgeber der Erfinder FINKENZELLER, Klaus, HARTEL, Karl Eglof und BRANDL, Denny

☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (ii)".

Blatt Nr. ...5...

Feld Nr. VIII (iii) ERKLÄRUNG: BERECHTIGUNG, DIE PRIORITÄT EINER FRÜHEREN ANMELDUNG ZU BEANSPRUCHEN

Die Erklärung muß dem in Abschnitt 213 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (iii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

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FINKENZELLER, Klaus und HARTEL, Karl Eglof sind kraft nachfolgend Aufgeführten berechtigt, die Priorität der früheren Anmeldung

Nr. 10 2006 027 200.5

zu beanspruchen:

die Anmelder sind die Erfinder des Gegenstands, für den um Schutz im Wege der früheren Anmeldung nachgesucht wurde.

☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (iii)".

Feld Nr. VIII (ii) ERKLÄRUNG: BERECHTIGUNG, EIN PATENT ZU BEANTRAGEN UND ZU ERHALTEN

Die Erklärung muß dem in Abschnitt 212 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (ii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

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Giesecke & Devrient GmbH ist berechtigt, als Arbeitgeber der Erfinder FINKENZELLER, Klaus, HARTEL, Karl Eglof und BRANDL, Denny

☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (ii)".

Feld Nr. VIII (iii) ERKLÄRUNG: BERECHTIGUNG, DIE PRIORITÄT EINER FRÜHEREN ANMELDUNG ZU BEANSPRUCHEN

Die Erklärung muß dem in Abschnitt 213 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (iii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

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Nr. 10 2006 027 200.5

zu beanspruchen:

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☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (iii)".

Blatt Nr. ...4...

Feld Nr. VIII (ii) ERKLÄRUNG: BERECHTIGUNG, EIN PATENT ZU BEANTRAGEN UND ZU ERHALTEN

Die Erklärung muß dem in Abschnitt 212 vorgeschriebenen Wortlaut entsprechen; siehe Anmerkungen zu den Feldern VIII, VIII (i) bis (v) (allgemein) und insbesondere die Anmerkungen zum Feld Nr. VIII (ii). Wird dieses Feld nicht benutzt, so sollte dieses Blatt dem Antrag nicht beigefügt werden.

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☐ Diese Erklärung wird auf dem folgenden Blatt fortgeführt, "Fortsetzungsblatt für Feld Nr. VIII (ii)".