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(54) **An electronic article surveillance device and a method for operating thereof**

(57) An electronic article surveillance (EAS) system comprising: a tag (150) comprising: a memory (155) configured to store at least a tag identifier; a communication interface (151) configured to communicate with external devices for sending the tag identifier; security mechanism (152, 153) configured to have a locked or unlocked mode;

a tag controller (154) configured to set the security mechanism (152, 153) in unlocked mode upon receiving an access code; and a server (140) comprising: a product purchase module (141) configured to receive a tag identifier, execute a product purchase transaction and return an access code for the tag identifier.

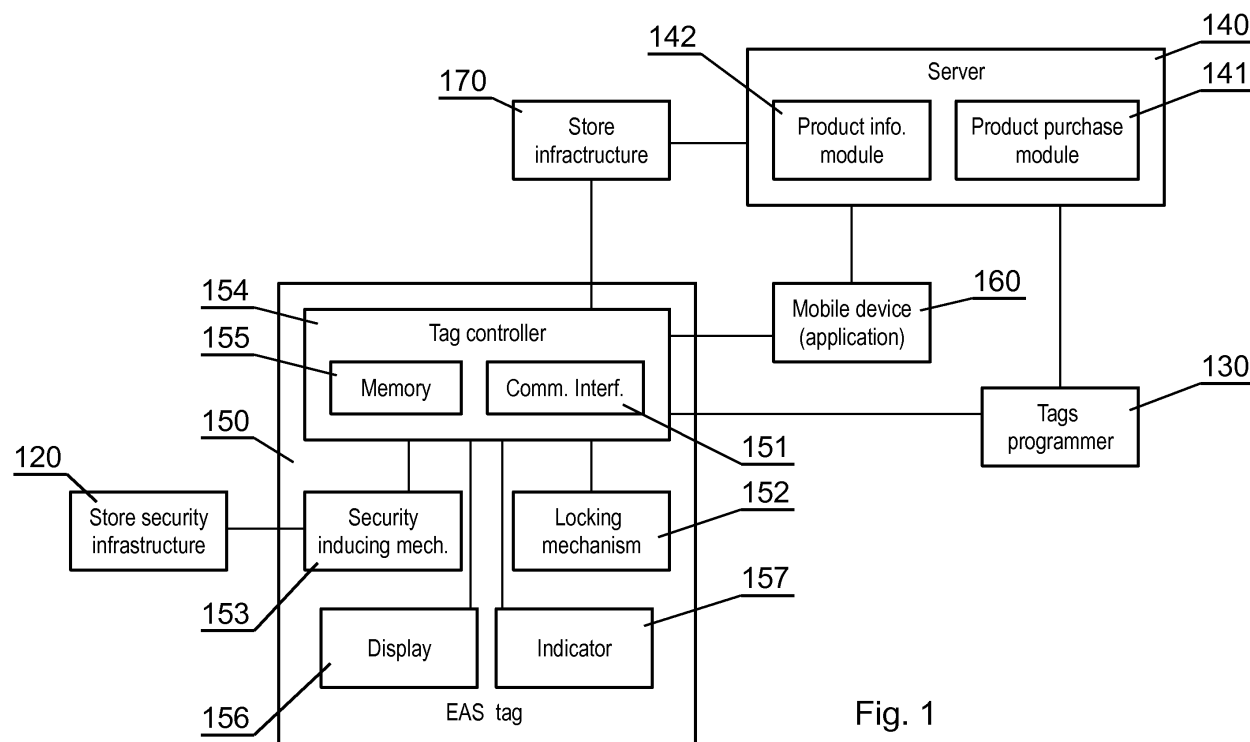


Fig. 1

Description

TECHNICAL FIELD

[0001] The present invention relates to electronic article surveillance devices, such as security tags.

BACKGROUND

[0002] Electronic article surveillance (EAS) is a method for preventing unauthorized removal of properties from a secured area, for example for preventing shoplifting from retail stores. The method utilizes special tags, usually called security tags, which are fixed to the products and can be removed or deactivated only by authorized persons when certain criteria are met, for example when a client pays from the product at the cashier. Detection means can be installed at the exits from the secured area which may trigger an alarm upon attempt to carry out a product with an attached or embedded active security tag.

[0003] There are known magnetic and acousto-magnetic EAS systems, which utilize tags made of a strip of amorphous metal and a strip of ferromagnetic material. These EAS tags can be activated and deactivated using special equipment emitting magnetic field, which is typically installed at each cashier's desk at store.

[0004] There are also known radio-frequency EAS systems. RF labels comprise an LC tank circuit that has a resonance peak at a specific frequency. Deactivation can be achieved by punching a hole, or by detuning the circuit by partially destroying the capacitor. This can be done by submitting the tag to a strong electromagnetic field at the resonant frequency.

[0005] Microwave EAS systems utilize permanent tags which are made of a diode coupled to one microwave and one electrostatic antenna. At the exit, one antenna emits a low-frequency field, and another one emits a microwave field. The tag acts as a mixer reemitting a combination of signals from both fields. These tags are permanent and expensive, typically used in clothing stores. The permanent tags are sometimes called hard tags.

[0006] A US patent US5942978 discloses a hard EAS tag, comprising a first element and a second element adapted for assembly together by snap connection through an article of merchandise, the EAS tag further comprising release means for selectively releasing said snap connection. It further discloses a detacher apparatus comprising a housing with removal means for selectively actuating said release means of the EAS tag to release said snap connection so that said first and second elements may be separated from each other to detach the EAS tag from the article of merchandise. The detacher apparatus further comprises control means for selectively actuating said removal means in response to an identification signal generated by said EAS tag. Therefore, the EAS tag needs to communicate with the detached apparatus via a dedicated proprietary communi-

cation link and is therefore not universal to communicate with.

[0007] A US patent US8223022 discloses a security tag assembly and a security system associated therewith to prevent the unauthorized removal of merchandise from a given area, such as a retail establishment. The security tag assembly comprises a base and at least one tag member removably connected in an operative position on the merchandise being protected. A locking assembly is structured to restrict detachment of the tag member and is forcibly disposed out of a locking orientation relative to said tag member. A detachment assembly and a data registering processor may include a two-way communication link which facilitates processing of the merchandise data disposed on the security tag assembly, such as inventory, purchase, location, origin of supplier or manufacturer. Such merchandise data may be transmitted by wireless communication with appropriate receiving facilities associated with a cash register or other check-out facilities. The electronic communication between the security tag and other devices is not explained in details.

[0008] A US patent US6646555 discloses a wireless communication device that attaches using magnetic force in whole or part to an article of manufacture having a magnetic surface portion. The wireless communication device contains a form of a magnet to provide magnetic force and attraction. The wireless communication device may be detached from the article by altering the magnetic force created by its associated magnet. Altering is accomplished by using an external device or a device internal to the wireless communication device. The external device may be used to generate the resonate frequency or the control system of the wireless communication device may be adapted to generate such frequency upon receipt of a communication command.

[0009] Currently, when a customer buys a product to which a hard EAS tag is attached, the customer must visit a cashier's desk to pay for the product and to have the tag deactivated and removed from the product in order to safely leave the store with the product bought. This impacts the time to buy the product and often leads to queues formed at the cashier's desks.

[0010] It would be therefore beneficial to improve the current electronic article surveillance devices in order to improve the user experience, in particular to improve the customer experience while shopping.

SUMMARY AND OBJECTS OF THE PRESENT INVENTION

[0011] There is presented an electronic article surveillance system comprising: a tag comprising: a memory configured to store at least a tag identifier; a communication interface configured to communicate with external devices for sending the tag identifier; security mechanism configured to have a locked or unlocked mode; a tag controller configured to set the security mechanism in

unlocked mode upon receiving an access code; and a server comprising: a product purchase module configured to receive a tag identifier, execute a product purchase transaction and return an access code for the tag identifier.

[0012] Preferably, the product purchase module is configured to send the access code for the tag identifier to a store infrastructure which is configured to send the access code to the tag.

[0013] Preferably, the product purchase module is configured to communicate with a user device via which the user conducts product purchase transaction.

[0014] Preferably, the product purchase module is configured to send the access code for the tag identifier to the user device via which the product purchase transaction was conducted and which is configured to send the access code to the tag.

[0015] Preferably, the tag is a hard tag physically attachable to a product and comprises a locking mechanism, wherein the tag controller is configured to unlock the locking mechanism to allow physical detachment of the tag from the product.

[0016] Preferably, the tag comprises a security inducing mechanism, wherein the tag controller is configured to unlock the security inducing mechanism such that it does not induce store security infrastructure.

[0017] Preferably, the tag is further configured to receive product-related data to be stored in the memory from the tags programmer.

[0018] Preferably, the tag is further configured to receive product-related data to be stored in the memory from the store infrastructure.

[0019] Preferably, the tag further comprises a display configured to display product-related data stored in memory.

[0020] Preferably, the tag further comprises a display configured to display customer-related data received from the mobile device.

[0021] Preferably, the tag further comprises a display configured to display customer-related data received from the store infrastructure.

[0022] Preferably, the tag further comprises a display configured to display information on whether the tag is in unlocked mode.

[0023] Preferably, the tag further comprises an indicator configured to notify audibly or visually the locked or unlocked mode of the tag.

[0024] There is also presented a method for operating an electronic article surveillance system with a security infrastructure, comprising the steps of: providing a plurality of tags attached to or embedded in products, each tag having a tag identifier and a security mechanism configured to have a locked or unlocked mode, wherein the tags are detectable by the security infrastructure; providing a server configured to execute a product purchase transaction related to a tag identifier and to return an access code for the tag identifier; providing means for allowing a user to communicate with the tag to read the

tag identifier and to communicate with the server to conduct the product purchase transaction; and unlocking the security mechanism of a tag after providing the access code to the tag.

BRIEF DESCRIPTION OF FIGURES

[0025] These and other objects of the invention presented herein are accomplished by providing an electronic article surveillance device and a method for operating thereof. Further details and features of the present invention, its nature and various advantages will become more apparent from the following detailed description of the preferred embodiments shown in a drawing, in which:

Fig. 1 presents a diagram of an electronic article surveillance system presented herein;

Fig. 2 presents a general concept of the method presented herein.

Fig. 3 presents a schematic of an EAS tag;

Fig. 4 presents a diagram of a method for electronic article surveillance according to a first embodiment; and

Fig. 5 presents a diagram of a method for electronic article surveillance according to a second embodiment;

NOTATION AND NOMENCLATURE

[0026] Some portions of the detailed description which follows are presented in terms of data processing procedures, steps or other symbolic representations of operations on data bits that can be performed on computer memory. Therefore, a computer executes such logical steps thus requiring physical manipulations of physical quantities.

[0027] Usually these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system. For reasons of common usage, these signals are referred to as bits, packets, messages, values, elements, symbols, characters, terms, numbers, or the like.

[0028] Additionally, all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Terms such as "processing" or "creating" or "transferring" or "executing" or "determining" or "detecting" or "obtaining" or "selecting" or "calculating" or "generating" or the like, refer to the action and processes of a computer system that manipulates and transforms data represented as physical (electronic) quantities within the computer's registers and memories into other data similarly represented as physical quantities within the memories or registers or other such information storage.

[0029] A computer-readable (storage) medium, such as referred to herein, typically may be non-transitory and/or comprise a non-transitory device. In this context,

a non-transitory storage medium may include a device that may be tangible, meaning that the device has a concrete physical form, although the device may change its physical state. Thus, for example, non-transitory refers to a device remaining tangible despite a change in state.

[0030] As utilized herein, the term "example" means serving as a non-limiting example, instance, or illustration. As utilized herein, the terms "for example" and "e.g." introduce a list of one or more non-limiting examples, instances, or illustrations.

DETAILED DESCRIPTION

[0031] Fig. 1 presents a diagram of the electronic article surveillance system presented herein. It may utilize a wireless data network, which links components of the system.

[0032] A server 140 stores products-related data, such as identification, inventory, pricing, and other data. It communicates with a tags programmer 130 for storing the product-related information on EAS tags 150. The tags programmer 130 is configured to write product identifying data and other information into the EAS tags 150 and may be a stationary or portable device communicating with the server 140 via a wired or wireless interface.

[0033] The EAS tags 150 are attached to the products (e.g. they can be hard tags attached to products, or strips glued on the products or inside the products) or embedded in the products (e.g. they are RFID chips embedded in products). The tags which are attached to or embedded in products, which are within the store and have not yet been bought by customers, have active security means 152, 153.

[0034] A security infrastructure 120 may include different types of EAS tag detectors, such as security gates installed at the store entrance/exit. The security infrastructure 120 is configured to detect active EAS tags 150 passing nearby specific points of the store, for example configured to detect unauthorized attempts to take a product with an active tag out of the store.

[0035] Figs. 2A, 2B presents a general concept of the method presented herein. A user having a mobile device 160, such as a mobile phone running a dedicated purchasing application, may wander through the store looking for products of interest. When a product of interest is found, the user may use the mobile device 160 to communicate with the EAS tag 150 to read at least the tag identifier. Then the mobile device may communicate, e.g. via Internet, with the server 140 to read detailed product-related information to which the tag is attached or in which it is embedded, and the product-related information may be presented at the screen of the mobile device 160, wherein the product-related information is provided by a product information module 142.

[0036] In case the user is interested in the product, the user may initiate a buying operation at the server 140, via a product purchase module 141, e.g. a module enabling communication with a product purchasing applica-

tion executed at the mobile device 160.

[0037] The user may pay for the product, for example by providing credit card information or by any other suitable payment means. Upon purchase of the product, the server 140 provides an access code for the tag, which allows unlocking the tag 150 which is attached to or embedded in the product. The access code along with an unlock command can be then sent to the tag to deactivate the tag, i.e. to make it undetectable for the store security infrastructure 120 or to allow detachment of a permanent tag from the product.

[0038] The unlock command can be sent to the tag 150 via the user's mobile device 160. The unlock command 150 may comprise EAS tag identifier and an unlock code.

[0039] Alternatively, the unlock command can be sent to the tag 150 via store infrastructure 170 (as shown in Fig. 2A), for example a communication device located within the communication range of the tag and communicating via the same means as the tag communicates with the mobile device 160 or other means. Preferably, the store infrastructure communicates with the tag 150 via Bluetooth Low Energy (BTE) protocol.

[0040] A permanent tag that is detached from the product, may be put to a tags basket installed e.g. at the exit of the store, before the security gates. A non-permanent tag that is deactivated may be simply carried out of the store without inducing the security gates.

[0041] On the other hand, as shown in Fig. 2B, when the tag 150 is not deactivated, it will induce the store security infrastructure 120.

[0042] The EAS tag 150 comprises a tag controller 154 and a memory 155. The memory may store computer executable instructions as well as configuration data of the EAS tag 150, such as the state of the EAS tag (i.e. active/inactive), the identifier of the EAS tag, the access code and/or identifier of the product to which the EAS tag is attached or in which the EAS tag is embedded. Product identifier may be further accompanied by information related to a method of purchase of the products, such as a link to a website allowing purchase of the product or a reference to a software application allowing such purchase or description of the product, or a photograph of the product or the like.

[0043] The tag controller 154 also executes data communication instruction(s) for communicating with external devices via a communication interface 151, preferably a short-range communication device enabling communication using protocols such as Bluetooth, Bluetooth Low Energy (BLE), Near Field Communication (NFC) or the like. In one embodiment, the memory 155 and the communication interface 151 may be realized as a proximity beacon.

[0044] The communication interface 151 is configured to send tag-related information (such as a tag identifier, state of the tag, product identifier) to external devices, such as store security infrastructure 120, tags programmer 130 or mobile devices 160.

[0045] Furthermore, the communication interface 151

is configured to receive tag-related information from external devices, such as tag programming information from the tags programmer 130 or an unlock command from a mobile device 160 or tags programmer 130. In order to change the state of the tag, i.e. to write new product information to the tag or to change the tag to an unlocked state, an access code may be first required to be transmitted to the tag.

[0046] The tag controller 154 can be configured to control a security mechanism in form of a locking mechanism 152 or a security inducing mechanism 153.

[0047] The tag controller 154 can be configured to drive a locking mechanism 152, if the tag is a permanent tag. The locking mechanism is configured to provide strong lock between two parts of the tag, such as to lock the tag to a product, such as a piece of clothing, in a permanent manner. When the EAS tag is locked, it is firmly secured to the product, and when the EAS tag is unlocked, it can be removed from the product.

[0048] Further, the tag controller 154 can be configured to drive a security inducing mechanism 153, such as an antenna transmitting signal of specific frequency, which may induce a security gate at the door of the shopping facility. When the EAS tag is locked, it induces the security infrastructure 120, and when the EAS tag is unlocked, its communication with the security infrastructure 120 may be disabled.

[0049] When the EAS tag is to be unlocked, the tag controller 154 sends a signal to unlock the locking mechanism 152 and/or the security inducing mechanism 153.

[0050] The EAS tag may audibly or visibly notify of its current state via an indicator 157. For example, a the indicator 157 may be a diode, wherein a green state of the diode may indicate an inactive, unlocked state while a red state of the diode may indicate an active, locked state. Further, the change of status from locked to unlocked may be indicated by an indicator 157 in form of a loudspeaker playing a sound.

[0051] The internal modules of the EAS tag may communicate via a shared data bus or different data flow paths.

[0052] The EAS tag may 150 further comprise a display 156 configured to display various tag-related or product-related data from memory 155. For example, the display 156 may present the status of the security means 152, 153, i.e. whether the tag is in locked or unlocked mode. Product-related information may include data such as product name and parameters. For example, if the product is a piece of clothing, the product data may include the material components, size etc. Presentation of information may be invoked upon initiation of communication with the mobile device of the user. The product information may be customized depending on the mobile device of the user, for example the mobile device may send commands to display information in a particular language or to display particular type of information. Moreover, based on the user identifier, the tag 150 or the server 140 may determine user-related data and customize the product

information displayed to user data, for example to inform the user whether the user has in possession the same or a similar product. Furthermore, advertising information may be provided, such as information on other products from the same collection of products.

[0053] Fig. 3A shows schematically a scenario where typical tags 150 are attached to products, such as hard EAS tags (e.g. BLE+RF or magneto-acoustic tags) or strip EAS tags (e.g. BLE+RF or magneto-acoustic tags). These tags are detectable by the store security infrastructure 120 and can be deactivated via the BLE communication infrastructure 170 after the user purchases the product via the mobile device 150.

[0054] Fig. 3B shows schematically another scenario, where tags 150 are embedded in products, such as BLE-communicable chips. These tags can be deactivated via the BLE communication infrastructure 170 after the user purchases the product via the mobile device 150. When the tag 150 is not deactivated, it can be non-operable.

[0055] Fig. 4 presents diagram of a method for electronic article surveillance according to a first embodiment. The method starts at step 401 from establishing a wireless communication with an EAS tag 150 via the mobile device 160 communicating with the communication interface 151.

[0056] Subsequently, at step 402 tag identification data is read from the tag, such as a tag identifier and/or product identifying data. The information may also include a link to a website where the product may be purchased. If only a tag identifier is read, the mobile device 160 should preferably have a dedicated software application installed that can handle the product identifiers and communicate with a specific server 140. Alternatively, if a link to a website is provided, there is no need for a dedicated application at the mobile device 160 - it is enough for the mobile device 160 to handle a general web browsing application.

[0057] Next, at step 403, the user may input a request to purchase the product and at step 404 the transaction is executed that may include payment and is suitably confirmed as a completed, valid transaction. Any of known payment mechanisms can be used, such as payment by credit card.

[0058] Further, at step 405, the user device 160 receives an access code for the EAS tag associated with the particular product that has been just purchased.

[0059] Subsequently, at step 406, the user device sends the access code along with an unlock command to the EAS tag 150 by communicating with the communication interface 151 of the tag 150. When the unlock code is received by the EAS tag 150, the unlocking is executed in step 407 and the EAS tag 150 may audibly or visibly notify the client that the EAS tag may be safely removed from the product and that the purchase is complete. Alternatively, information about unlocked tag may be provided to the user via the mobile device 160, when the EAS tag 150, upon completion of the unlocking operation, sends unlocking status via the communication

interface to the mobile device 160.

[0060] Fig. 5 presents a diagram of a method for electronic article surveillance according to a first embodiment. The method steps 501-504 correspond to the method steps 401-404. When a purchase transaction is complete, the server 140 is notified and the server 140 sends in step 405 an unlock command for the particular EAS tag 150 via the tags programmer 130. In one embodiment, the tags programmer 130 may have a communication range that allows to communicate with a plurality of tags at the store, for example the tags programmer 130 may have a coverage of the whole store or there may be a plurality of tag programmers 130 installed at the store, each having a specific coverage. In another embodiment, there may be a tags programmer 130 installed at a specific place at the store, for example at the cashier's desk or at the exit of the store, so that the user may come with a purchased product to that tags programmer 130 and to deactivate the tag there. Since deactivation of a tag in steps 506 and 507 is a simple procedure as the tag product has been already purchased via electronic transaction, this may minimize the waiting time, even if many customers want to deactivate their tags using the same tags programmer 130.

[0061] The present invention relates to application of EAS tags and merchandising using EAS tags. The new approach is useful as it allows to omit a manual detachment of EAS by an employee of a store. Therefore, the invention provides a useful, concrete and tangible result.

[0062] EAS tags as well as the system implementing the present invention are particular machines, therefore the machine or transformation test is fulfilled and that the idea is not abstract.

[0063] It can be easily recognized, by one skilled in the art, that the aforementioned method for operating an electronic article surveillance device may be performed and/or controlled by one or more computer programs. Such computer programs are typically executed by utilizing the computing resources in a computing device. Applications are stored on a non-transitory medium. An example of a non-transitory medium is a non-volatile memory, for example a flash memory while an example of a volatile memory is RAM. The computer instructions are executed by a processor. These memories are exemplary recording media for storing computer programs comprising computer-executable instructions performing all the steps of the computer-implemented method according to the technical concept presented herein.

[0064] While the invention presented herein has been depicted, described, and has been defined with reference to particular preferred embodiments, such references and examples of implementation in the foregoing specification do not imply any limitation on the invention. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader scope of the technical concept. The presented preferred embodiments are exemplary only, and are not exhaustive of the scope of the technical concept pre-

sented herein.

[0065] Accordingly, the scope of protection is not limited to the preferred embodiments described in the specification, but is only limited by the claims that follow.

Claims

1. An electronic article surveillance (EAS) system comprising:
 - a tag (150) comprising:
 - a memory (155) configured to store at least a tag identifier;
 - a communication interface (151) configured to communicate with external devices for sending the tag identifier;
 - security mechanism (152, 153) configured to have a locked or unlocked mode;
 - a tag controller (154) configured to set the security mechanism (152, 153) in unlocked mode upon receiving an access code; and
 - a server (140) comprising:
 - a product purchase module (141) configured to receive a tag identifier, execute a product purchase transaction and return an access code for the tag identifier.
2. The system according to claim 1, wherein the product purchase module (141) is configured to send the access code for the tag identifier to a store infrastructure (170) which is configured to send the access code to the tag (150).
3. The system according to claim 1, wherein the product purchase module (141) is configured to communicate with a user device (160) via which the user conducts product purchase transaction.
4. The system according to claim 3, wherein product purchase module (141) is configured to send the access code for the tag identifier to the user device (160) via which the product purchase transaction was conducted and which is configured to send the access code to the tag (150).
5. The system according to any of previous claims, wherein the tag (150) is a hard tag physically attachable to a product and comprises a locking mechanism (152), wherein the tag controller (154) is configured to unlock the locking mechanism (152) to allow physical detachment of the tag (150) from the product.
6. The system according to any of previous claims,

wherein the tag (150) comprises a security inducing mechanism (153), wherein the tag controller (154) is configured to unlock the security inducing mechanism (153) such that it does not induce store security infrastructure (120).

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7. The system according to any of previous claims, wherein the tag (150) is further configured to receive product-related data to be stored in the memory (155) from the tags programmer (130). 10
8. The system according to any of previous claims, wherein the tag (150) is further configured to receive product-related data to be stored in the memory (155) from the store infrastructure (170). 15
9. The system according to claim 7 or 8, wherein the tag (150) further comprises a display (156) configured to display product-related data stored in memory (155). 20
10. The system according to any of previous claims, wherein the tag (150) further comprises a display (156) configured to display customer-related data received from the mobile device (160). 25
11. The system according to any of previous claims, wherein the tag (150) further comprises a display (156) configured to display customer-related data received from the store infrastructure (170). 30
12. The system according to any of previous claims, wherein the tag (150) further comprises a display (156) configured to display information on whether the tag is in unlocked mode. 35
13. The system according to any of previous claims, wherein the tag (150) further comprises an indicator (157) configured to notify audibly or visually the locked or unlocked mode of the tag (150). 40
14. A method for operating an electronic article surveillance (EAS) system with a security infrastructure (120), comprising the steps of: 45
 - providing a plurality of tags (150) attached to or embedded in products, each tag (150) having a tag identifier and a security mechanism (152, 153) configured to have a locked or unlocked mode, wherein the tags (150) are detectable by the security infrastructure (120); 50
 - providing a server (140) configured to execute a product purchase transaction related to a tag identifier and to return an access code for the tag identifier; 55
 - providing means for allowing a user to communicate with the tag (150) to read the tag identifier and to communicate with the server (140) to con-

duct the product purchase transaction; and
- unlocking the security mechanism (152, 153) of a tag after providing the access code to the tag (150).

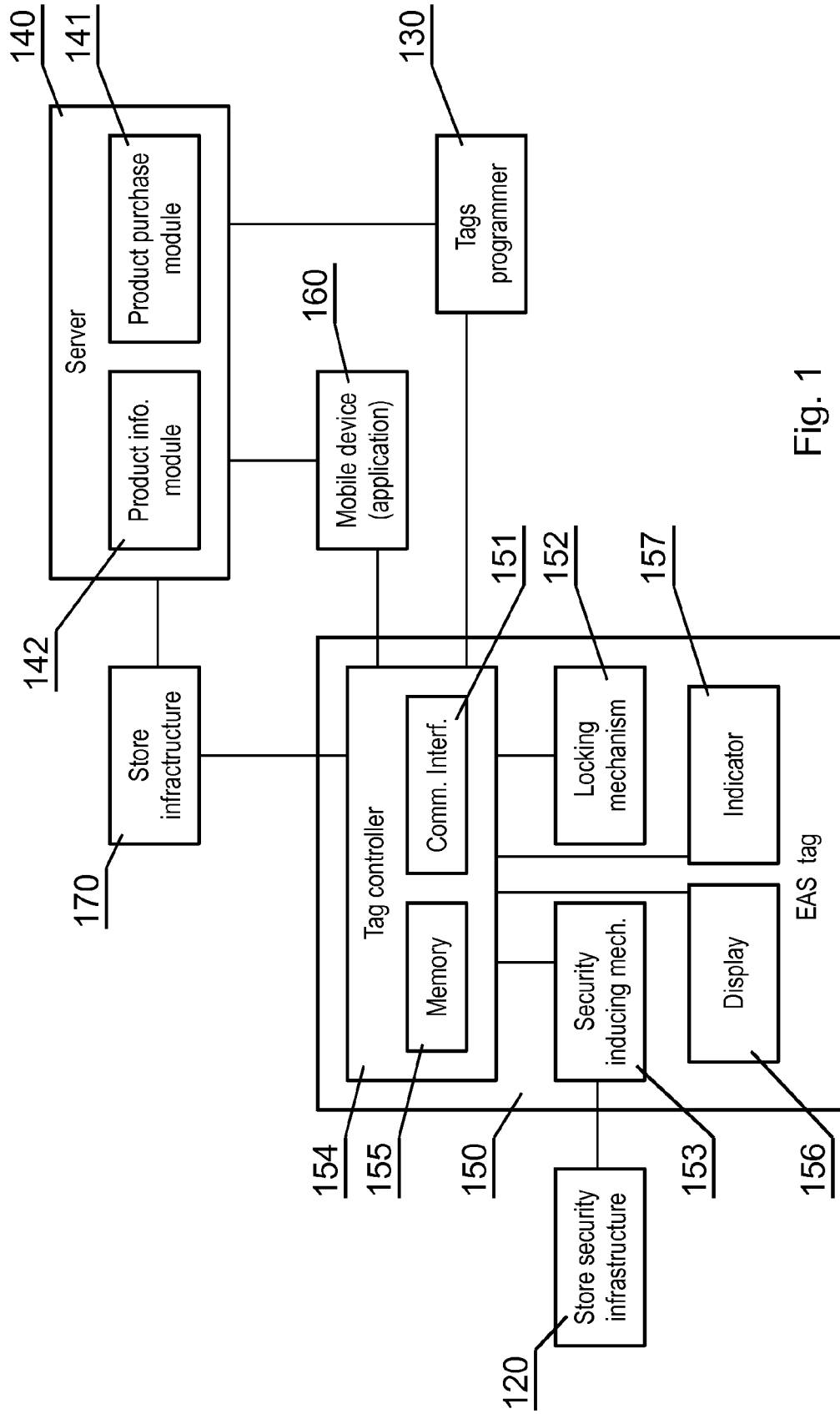
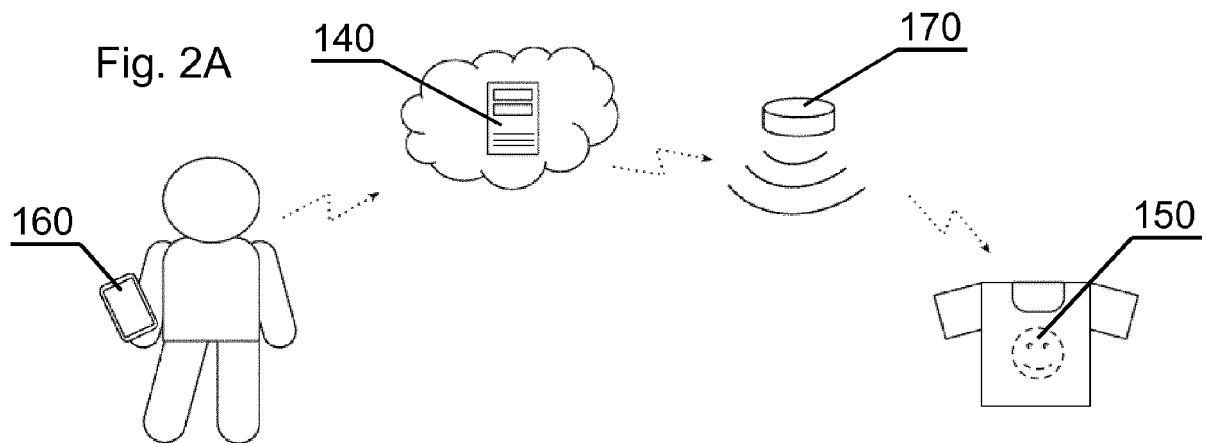
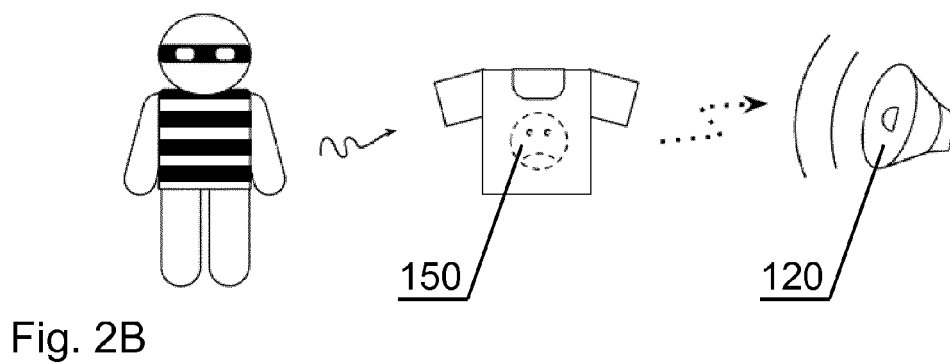


Fig. 1

With application on mobile telephone, connected to the server, communicating with in-store system, customer purchases product secured by device. Device changes its state to "unlocked", enabling customer to leave the store.



In case of unauthorized opening attempt, apparatus broadcasts alarm signal to the store infrastructure.



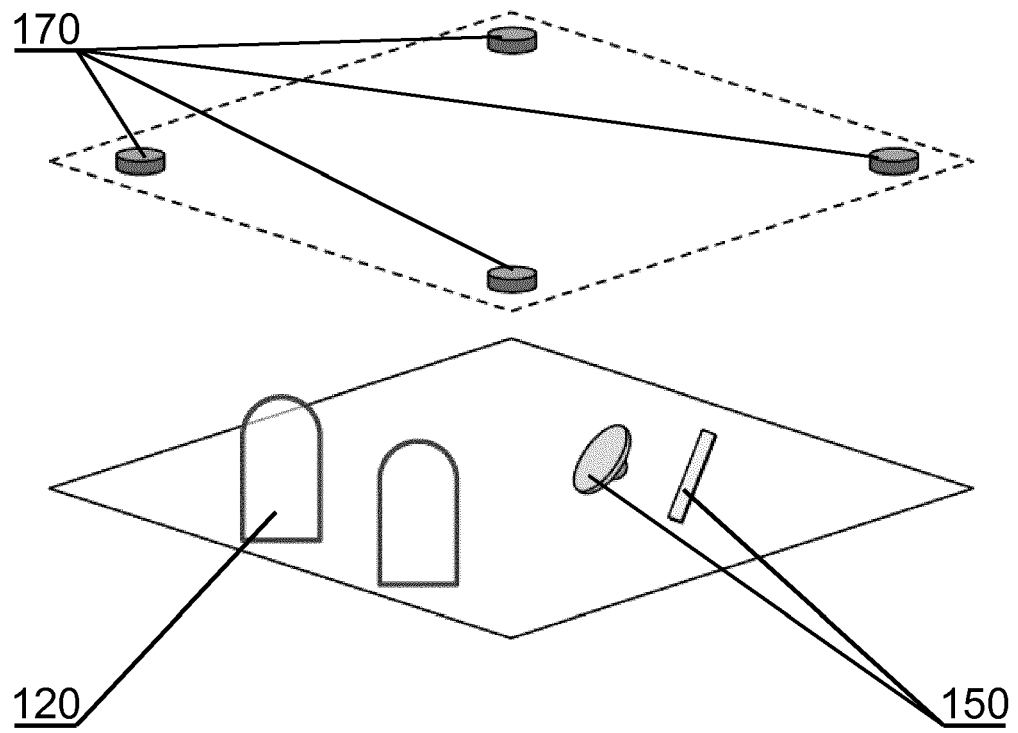


Fig. 3A

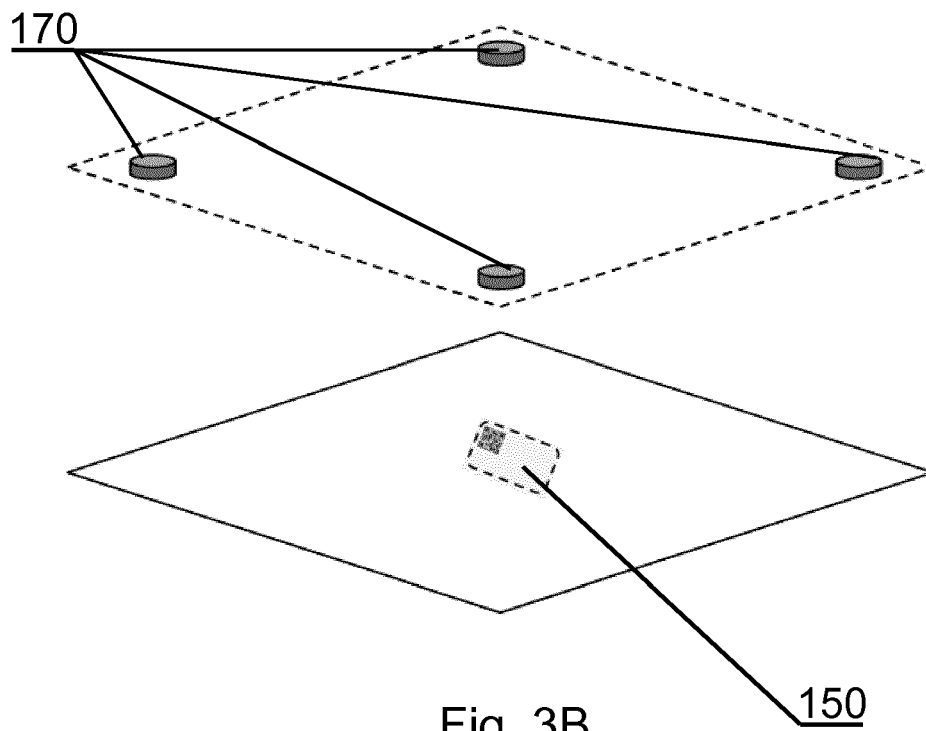


Fig. 3B

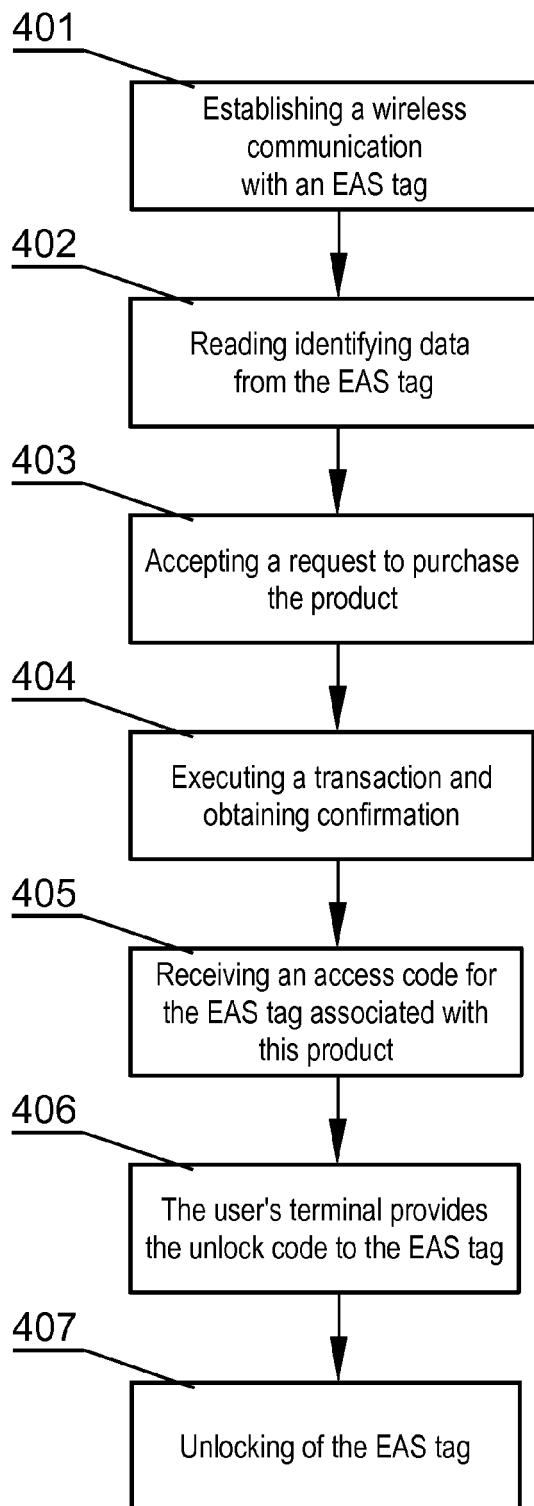


Fig. 4

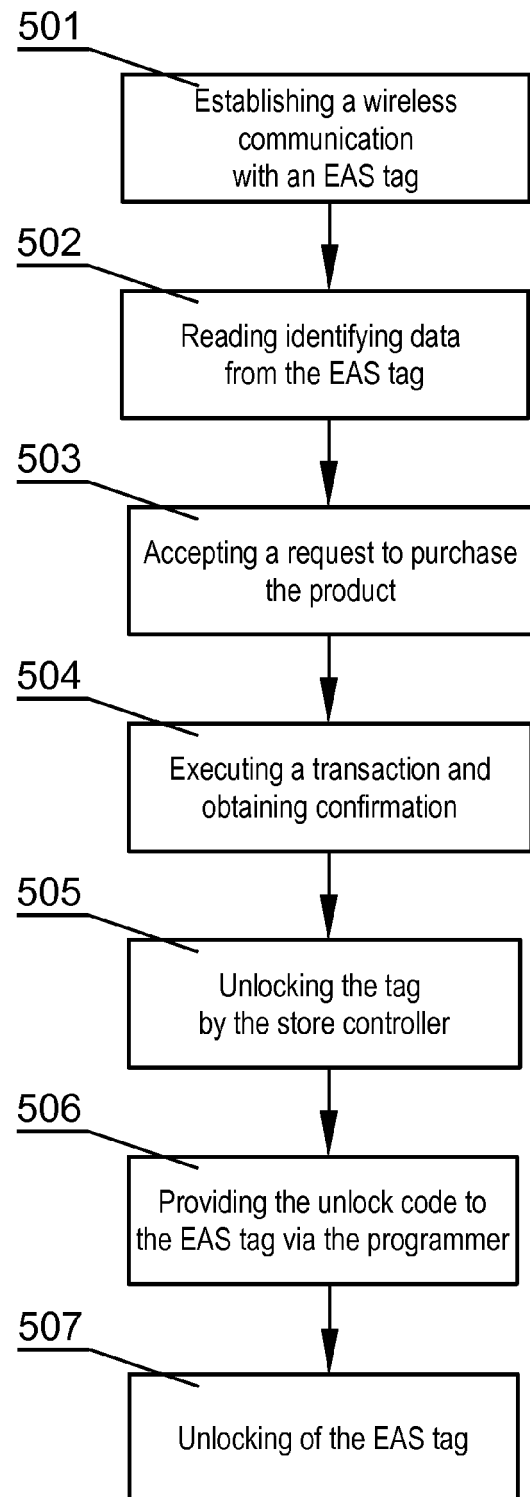


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 14 46 1605

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2014/046760 A1 (TYCO FIRE & SECURITY GMBH [CH]; RASBAND PAUL BRENT [US]; SEQUEIRA MELW) 27 March 2014 (2014-03-27) * page 8, line 8 - page 10, line 9; figure 1 * * page 10, line 19 - page 13, line 7 * * page 13, line 16 - page 15, line 2 * * page 15, line 8 - page 17, line 5; figure 2 * * page 17, line 22 - page 18, line 20 *	1-14	INV. G08B13/24
A	WO 2014/009617 A2 (EXAQTWORLD [FR]) 16 January 2014 (2014-01-16) * page 29, line 14 - page 31, line 14 * * page 46, line 19 - page 47, line 31 * * page 58, line 26 - line 32 * * page 62, line 24 - page 63, line 9 *	1-14	
A	WO 2013/153282 A1 (MARISENSE OY [FI]) 17 October 2013 (2013-10-17) * abstract * * page 5, line 31 - page 6, line 13 *	9-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			G08B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 June 2015	Examiner La Gioia, Cosimo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 46 1605

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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09-06-2015

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