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(71) Applicant *(for all designated States except US)*: **TELENOR ASA** [NO/NO]; Snarøyveien 30, N-1331 Fornebu (NO).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **BREDE, Steinar** [NO/NO]; Otto Nielsensvei 12, N-7004 Trondheim (NO).

(74) Agents: **ONSAGERS AS** et al.; P.O. Box 6963 St. Olavs Plass, N-0130 Oslo (NO).

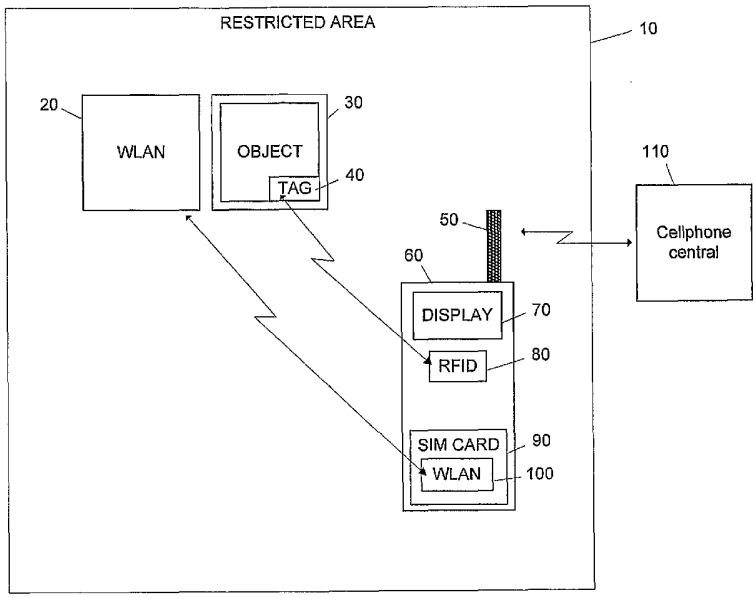
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(54) **Title:** MOBILE PHONE WITH RFID READER AND WLAN TRANSMITTER INTEGRATED ON SIM CARD



(57) **Abstract:** A method and system for acquiring information related to a transponder (RFID tag 40) read by a mobile telephone 60 comprising a RFID reader 80, and an identification and authentication module (SIM card 90) . When the RFID reader has read the data from the RFID tag 40, the identifier and the content data is processed and transmitted to a local network for further processing and delivery of supplementary information linked to the RFID tag 40. The SIM card comprises a Wlan transmitter, and transmitting of the identifier is via the WLAN.

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MOBILE PHONE WITH RFID READER AND WLAN TRANSMITTER INTEGRATED ON SIM CARD

Introduction

The present invention relates to the field of radio frequency communication. More specifically, it relates to identification of a tag for accessing supplementary information regarding an object marked with the tag. The invention describes a method and system combining several technologies for accessing said information. By combining telecommunication, WLAN, and radio frequency identification, a novel and flexible method and system is accomplished.

The invention is suitable for different purposes, e.g. museum guiding, tourist guiding, non-contact payment systems, wireless security and authentication, and smart objects.

Background of the invention/Prior art

Radio frequency identification (RFID) is a technology for storing and retrieving data from identification tags. RFID tags can be interrogated and read on a short distance from a RFID reader.

RFID technology in connection with mobile phones has been launched through Sony Felica technology, and Philips and Sony have recently teamed up with Nokia to establish the NFC (Near Field Communication) Forum, which will promote the implementation and standardization of NFC technology.

In most previous scenarios the mobile handsets have been the bearers of a tag while the RFID reader has been stationary. NFC technology have the possibility of both being an active reader and passive tag. This opens the possibility of having RFID readers in mobile handsets, giving the possibility of making the tag stationary and the handsets movable.

Known systems deploying RFID technology for Mobile phones in the area of non-contact Payment and Wireless Security and Authentication etc., locate the active RFID reader at a stationary fixed location where communication is to occur (contact point). This requires an infrastructure of active RFID readers at all contact points. The cost of an active RFID reader is significantly larger than a passive tag. In some scenarios, it is therefore advantageous to use passive RFID tags.

The present invention addresses scenarios where applications require a large number of contact points and where it is advantageous to use an active RFID reader located in the mobile unit and passive tags as contact points.

As an example, in Louvers there are exhibited around 29000 works of art. It would be cost effective to tag each piece of art with a passive RFID tag rather than an active RFID reader.

The present invention merges telecommunication, RFID, WLAN and SIM card technology. By introducing use of WLAN as means for accessing supplementary information regarding an object marked with a tag, the user of the system will experience a more cost effective and faster service.

By transmitting tag information to a local WLAN infrastructure instead of through the mobile network, the user of the system will get quicker response and may control services locally.

The present invention comprises a SIM card with its SIM card specific circuitry integrated with WLAN and active RFID reader circuitry on the handset. A tag is read by means of the RFID reader, and its information is sent to a WLAN network by means of the integrated WLAN transmitter on the SIM card.

Since the communication processing is performed on the SIM card, billing of local WLAN services can be performed.

The present invention can be utilized by telecom operators, thereby giving the possibility of launching new services.

Summary of the invention

The present invention covers different aspects of accessing information by using a mobile phone with RFID reader technology, and a SIM card with integrated WLAN means.

According to a first aspect, the invention establishes a novel method for using a mobile phone for acquiring supplementary information regarding an object provided with an identification tag. The method is characterised by performing the following steps:

- broadcasting the presence and identification of the mobile phone by transmitting signals from active WLAN means, integrated on the SIM card in the mobile phone, to an information processing server available through a local WLAN network, said information processing server comprises means for communicating with the telecom operator of the mobile phone;
- receiving a request presented on the mobile phone from the telecom operator asking the user of the mobile phone if the information acquiring service available is accepted, and if accepted:
- reconfiguring the mobile phone making it ready for acquiring supplementary

information regarding an object, said reconfiguring includes activating a radio frequency identification tag reader in the mobile phone;
- reading identifier information from an identification tag close to the mobile phone by means of the radio frequency identification tag reader;

- processing the read information on the SIM card.
- sending the identifier information to the information processing server through the embedded WLAN on the SIM card to the local WLAN network;
- receiving supplementary information on the mobile phone through the local WLAN network regarding the object provided with the information tag.

According to a second aspect, the invention describes a system for using a mobile phone for acquiring supplementary information regarding an object provided with an identification tag, and where the system comprises means for performing the method described above.

The objects stated above are achieved by means of a method, system and a device as set forth in the appended set of claims.

Detailed description

The invention will now be explained in more detail with reference to the figures where:

Figure 1 shows an overview of the system according to the invention, and

Figure 2 shows a flow chart describing an example of use of the invention.

As mentioned, the invention merges SIM cards, RFID systems and WLAN systems with mobile phone systems, thus opening the market for new applications and services for mobile phones.

Merging the SIM card with an active RFID reader/interrogator and a WLAN transmitter introduces a number of new possibilities.

From a system perspective the Subscriber Identity Module (SIM) card, is the device holding the A3 and A8 algorithms and the IMSI (International Mobile Subscriber Identity) and the Subscriber Authentication Key (Ki) in a GSM network. These keys and algorithms are used for authentication and identification in the GSM network. Introducing a RFID reader/interrogator in conjunction with the SIM card pursues the tasks of the SIM card for authentication and identification on a separate new wireless interface. This enables operators, third party developers and content/service delivery companies to perform billing toward such services.

One of the advantages of the GSM architecture and the SIM-card is that the SIM-card can be moved from one Mobile Phone to another. Arranging a WLAN

transmitter on a SIM card makes upgrades very simple for the users and makes the SIM card a "personal" device. When linked to the concept of physical browsing a user may be authenticated and authorized towards an infrastructure of RFID tags and the WLAN infrastructure for service delivery.

The invention discloses a SIM card that controls a RFID reader/interrogator in the mobile phone. RFID based applications and services may thereby be user or telecom operator initiated, i.e. a service may use the location of a mobile phone within the GSM network to initiate a RFID service.

Figure 1 shows the inventive system set up for accessing supplementary information with regard to an object linked to an identification tag.

The system comprises at least one object 30, within a restricted area 10, provided with an identification tag 40 making it possible to identify the object 30.

The system further comprises a local WLAN server 20 for storing and handling relevant supplementary information regarding the object 30.

For using the system, a mobile phone 60 with a display 70 for presenting information to the user is further provided with a SIM card 90 with integrated means for WLAN 100.

The key feature of the system is a RFID reader 80 integrated in the mobile phone 60. This makes it possible to read information from an identification tag 40.

When the RFID reader 80 has read the identification from the identification tag 40, the identification is transmitted through the integrated WLAN means 100 on the SIM card 90 thereby enabling requests for supplementary information from the local WLAN server 20.

The system also comprises a mobile phone central 110 communicating with the mobile phone 60 through the antenna 50 of the mobile phone 60, enabling the network operator of the mobile phone 60 to charge for services used. This is further described below.

In the following an example on how this system can be used is described.

Figure 2 shows a flow chart describing an example of use of the system according to the invention. This is only one scenario meant to illustrate some of the concepts of the system. A skilled person in the art will realize that the invention can be used in a plurality of other implementations.

A subscriber to a "museum guide" service within a restricted area 10 is walking towards the restricted area 10. The museums local WLAN network 20 detects the active WLAN 100 on the SIM card 90 and has this user on list of subscribers,

indicated in 1). The "museum service" starts an initiation process of the service by asking the telecom operator through a cellphone central 110 to reconfigure the mobile phone 60 for the service, denoted in 2).

If the user accepts he/she will receive a new configuration for the mobile phone from the operator with a welcome message asking for approval before the new settings are operational, denoted by 3) and 4). The new configuration may include activating the RFID reader 80, adding new themes, adjusting WLAN settings for content delivery, charging the customer etc.

When the subscriber of the service walks to a picture and holds the mobile phone toward a passive RFID tag close by the picture, denoted by 5), the tag containing an identifier and possibly content data is read 6). This information is processed in 7) enabling the SIM card to transmit the identifier by means of its local WLAN 100 to the WLAN server 20, denoted in 8). The WLAN server 20 responds with delivery of supplementary content to the subscriber through the operator-controlled WLAN network, indicated in 9).

In a preferred embodiment, the RFID reader 80 is located in the mobile phone 60, e.g. a mobile phone with a SIM card 90 containing integrated WLAN circuitry 100 and means for communicating with the RFID reader 80.

In another embodiment, the RFID reader 80 is fitted on the SIM card 90 together with the WLAN circuitry 100.

Fitting WLAN circuitry and SIM specific circuitry on one single SIM-card poses challenges in terms of physical size and antenna construction, but it is feasible by careful construction.

A SIM-card used in current GSM handsets has an outer dimensions 15 x 25 x 1 mm defined in ETSI TS 102 221 Smart cards; UICC-terminal interface; Physical and logical characteristics (Release 6).

Telenor has already implemented WLAN circuitry on a SIM card. The addition of circuitry for communicating with a RFID reader performing the communication with the tags and facilitating data transfers will make the SIM card far more flexible. The RFID reader/interrogator should perform functions like; signal conditioning, parity error checking and correction, algorithms for decoding and retransmission control.

The communication between the SIM card 90 and the mobile phone 60 is not changed with regard to standard SIM cards (3GPP standard). It is be possible to interact with the RFID reader 80 from the mobile phone 60 by making use of SIM-card programming. This enables turning the reader on/off, and thereby enabling/disabling mobile services from the mobile phone network.

CLAIMS

1. A method for using a mobile phone (60) for acquiring supplementary information regarding an object (30) provided with an identification tag (40), characterised in performing the following steps:

- broadcasting the presence and identification of the mobile phone (60) by transmitting signals from active WLAN means, (100) integrated on the SIM card (90) in the mobile phone (60), to an information processing server (20) available through a local WLAN network, said information processing server (20) comprises means for communicating with the telecom operator (110) of the mobile phone (60);

- receiving a request presented on the mobile phone (60) from the telecom operator (110) asking the user of the mobile phone (60) if the information acquiring service available is accepted, and if accepted;

- reconfiguring the mobile phone (60) making it ready for acquiring supplementary information regarding an object (30), said reconfiguring includes activating a radio frequency identification tag reader (80) in the mobile phone (60);

- reading identifier information from an identification tag (40) close to the mobile phone (60) by means of the radio frequency identification tag reader (80);

- sending the identifier information to the information processing server (20) through the local WLAN network;

- receiving supplementary information on the mobile phone (60) through the WLAN network, regarding the object (30) provided with the information tag (40).

2. A method according to claim 1, characterised in that the presence and identification signals include SIM card specific parameters.

3. A method according to claim 1, characterised in that the reconfiguring of the mobile phone (60) is performed according to instructions received from the telecom operator (110).

4. A system (10) for using a mobile phone (60) for acquiring supplementary information regarding an object (30) provided with an identification tag (40), c h a r a c t e r i s e d i n that the system (10) comprises:

- means for broadcasting the presence and identification of the mobile phone (60) by transmitting signals from active WLAN means (100), in the mobile phone (60), to an information processing server (20) available through a local WLAN network, said information processing server (20) comprises means for communicating with the telecom operator (110) of the mobile phone (60);

- means for receiving a request presented on the mobile phone (60) from the telecom operator (110) asking the user of the mobile phone (60) if the information acquiring service available is accepted;

- means for reconfiguring the mobile phone (60) making it ready for acquiring supplementary information regarding an object (30), said reconfiguring includes means for activating a radio frequency identification tag reader (80) in the mobile phone (60);

- means for reading an identifier from an information tag (40) close to the mobile phone (60) by means of the radio frequency identification tag reader (80);

- means for sending the identifier information to the information processing server (20) through the local WLAN network;

- means for receiving supplementary information on the mobile phone (60) through the local WLAN network regarding the object (30) provided with the information tag (40).

5. A SIM card (90) for a mobile phone (60), comprising a processing device, a memory device, an I/O device, and a wireless communication device, c h a r a c t e r i s e d i n that it further comprises means for communicating with a radio frequency identification tag reader (80).

6. A SIM card (90) according to claim 5, c h a r a c t e r i s e d i n that the radio frequency identification tag reader (80) is arranged to be operatively enabled or disabled, controlled by a signal provided by the wireless

communication device via said I/O device.

7. A SIM card (90) according to one of the claims 5-6, used in the system claimed in claim 4.

5

8. A mobile phone (60) comprising a SIM card (90) as claimed in one of the claims 5-7.

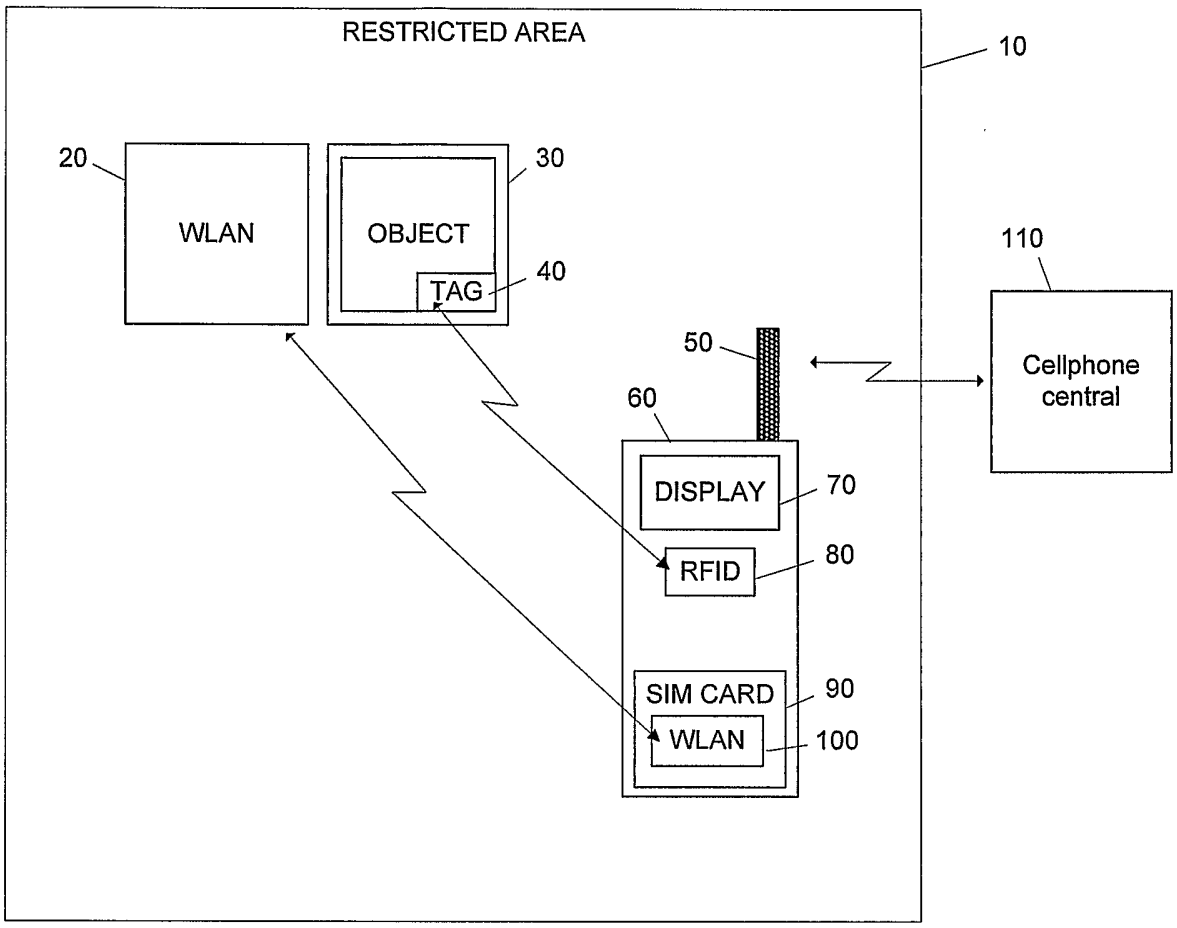

RESTRICTED AREA
10
20
WLAN
OBJECT
30
TAG
40
110
Cellphone central
50
60
DISPLAY
70
RFID
80
SIM CARD
90
WLAN
100

Figure 1

5

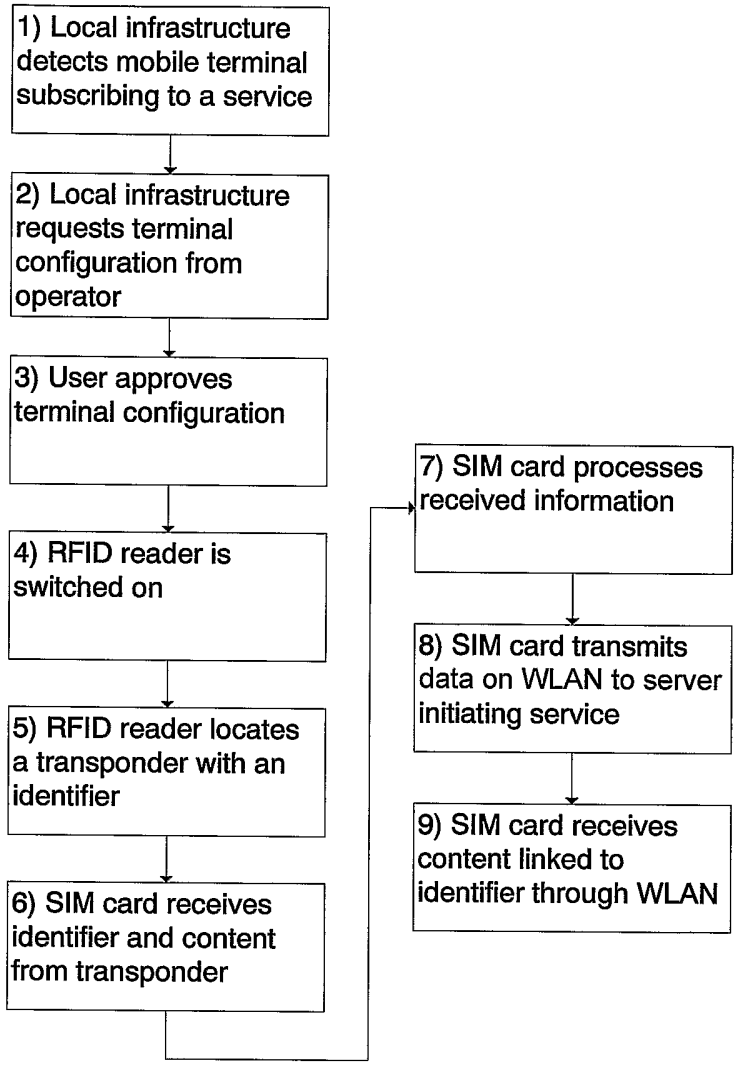

1) Local infrastructure detects mobile terminal subscribing to a service
2) Local infrastructure requests terminal configuration from operator
3) User approves terminal configuration
4) RFID reader is switched on
5) RFID reader locates a transponder with an identifier
6) SIM card receives identifier and content from transponder
7) SIM card processes received information
8) SIM card transmits data on WLAN to server initiating service
9) SIM card receives content linked to identifier through WLAN

Figure 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/NO2006/000228

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L29/06 H04L12/28

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)
H04L H04Q 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, INSPEC, COMPENDEX, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of Box C. [X] 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

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"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
7 September 2006	25/09/2006

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	Kesting, Volker

INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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