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- (54) Benævnelse: **TRÅDLØST RADIOKOMMUNIKATIONSSYSTEM TIL FORBRUGSMÅLERE**
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DESCRIPTION

Field of the invention

[0001] The present invention relates to a wireless system for radio communication between consumption meters and other units, such as for instance meter reading systems.

Background of the invention

[0002] Traditionally, the consumption registered by different forms of consumption meters (gas, water, electricity, etc.) were recorded by employees of the supplying authorities travelling around and visually reading the meter values displayed by the consumption meters. In a more modern approach, the consumer reads the consumption meter displays and sends the read values to a central register, for instance either by mail, telephone or e-mail or by entering the values on a web page on the Internet.

[0003] In the later years, automatic reading of the consumption meters has become increasingly more common. In this case, the consumption meter automatically transmits its reading values, typically by wireless radio communication. The data is typically transmitted either directly to a large system handling the readings from consumption meters in a larger (urban) area or to a so-called "concentrator". The concentrator handles a smaller number of consumption meters (for instance in a single building) and functions as a gateway to the larger (urban) system, for instance via the Internet.

[0004] In the case of installation of new consumption meters or replacement of existing consumption meters, however, the identification and location of the new consumption meter still has to be registered and entered into the system and/or the concentrator manually or by using expensive specialized equipment, before the consumption meter can be activated and its consumption readings registered. WO2007/135233 discloses a system and a method for wireless radio communication for consumption meters wherein the measured data is sent over telecommunication links to a desired party. According to the document RFID devices are used to produce and read information on the building, an energy meter and its telecommunications links are used to forward the RFID-based building information.

[0005] US6867707 discloses a wireless radio communication system for electricity meters, the system comprising a consumption meter able to communicate using RF-communication with a remote network, the system further comprising a mobile device able to communicate with the remote network via RF-communication, and the mobile device being able to communicate with the consumption meter via an optical probe.

Brief description of the invention

[0006] It is an object of the present invention to provide a wireless radio communication system for consumption meters, which eliminates the above-identified problems with systems known in the art.

[0007] The present invention relates to a wireless radio communication system for consumption meters, defined by the features of claim 1 and its corresponding method defined by the features of claim 7.

[0008] Using such a configuration, it is possible to automatically transmit data from a consumption meter to a mobile communication device, such as a smartphone with a suitable application designed therefore, because the consumption meter and the device are able to communicate with each other using the HF band.

[0009] In an embodiment of the invention, the third set of radio frequency bands comprises said HF band.

[0010] If the meter reading system is able to communicate in the HF band as well, the data from the consumption meter may be communicated to the system from the mobile communication device using the same HF band.

[0011] In an embodiment of the invention, the third set of radio frequency bands comprises said second VHF/UHF band.

[0012] If the meter reading system is able to communicate in the same VHF/UHF as the mobile communication device, the consumption meter data can also be communicated from the mobile communication device to the meter reading system without using the HF band.

[0013] In an embodiment of the invention, the HF band is used for near field communication, for instance according to NFC or RFID standards as known within the field.

[0014] Using such a configuration, it is possible to automatically register data from a consumption meter simply by placing the mobile communication device physically on or close to the consumption meter. The data from the consumption meter can then be communicated to the mobile communication device through near field communication in the HF band without using any energy from the battery of the consumption meter, since all the necessary energy for the communication is delivered by the mobile communication device. Similarly, the consumption meter data may be transferred from the mobile communication device to the meter reading system by simply placing the device on or near to the system or a part thereof.

[0015] In an embodiment of the invention, said first VHF/UHF band is different from said second VHF/UHF band.

[0016] Typically, the second VHF/UHF band used by the mobile communication device will be a licensed band used for wireless telephony according to certain standards, such as for instance the GSM standard or the like. Apart from using licensed frequency bands, such standards typically requires the communication to follow rather energy-consuming communication protocols.

[0017] Consumption meters, in which the batteries cannot be easily replaced or recharged, usually communicate using far less energy-consuming protocols. This communication typically either uses frequency bands dedicated for meter communication, such as for instance the 169 MHz band (in Europe) or one of the open ISM (Industrial Scientific Medical) frequency bands, such as the 433 MHz band or the 868 MHz band (in Europe) or the 2.4 GHz band (worldwide).

[0018] In an embodiment of the invention, the HF band is used for transferring at least meter identification information.

[0019] Transferring meter identification information to the mobile communication device is advantageous, because this information will typically have to be registered manually in systems known in the art.

[0020] In the invention, the first VHF/UHF band is used for transferring at least meter consumption data from the one or more consumption meters to the one or more meter reading systems.

[0021] Once the consumption meter has been registered and activated in the system, it is advantageous if it is able to transfer consumption data directly to the system whenever appropriate.

[0022] In an embodiment of the invention, the second VHF/UHF band is used for communication with a public cellular mobile communication system.

[0023] If the second VHF/UHF band is chosen appropriately, existing mobile telephone systems may be used for communication between the mobile communication device, the consumption meter and/or the meter reading system.

[0024] In an embodiment of the invention, the one or more mobile communication devices are adapted to obtain location data about their own positions.

[0025] If the mobile communication device is able to locate its own position, for instance using GPS or another common positioning system, no manual registration of the position is needed.

[0026] In an embodiment of the invention, the second VHF/UHF band is used for transferring meter identification information and said location data to one or more of the one or more meter reading systems.

[0027] In this way, all the consumption meter data needed for registration and activation of the consumption meter can be automatically transferred to the system in one step only.

Figures

[0028] In the following, a few exemplary embodiments of the invention will be described with reference to the figures, of which

fig. 1

illustrates schematically a radio communication system according to a first embodiment of the invention,

fig. 2

illustrates schematically a radio communication system according to a second embodiment of the invention,

fig. 3

illustrates schematically a radio communication system according to a third embodiment of the invention, and

fig. 4

illustrates schematically a radio communication system according to a fourth embodiment of the invention.

Detailed description of the invention

[0029] Fig. 1 illustrates schematically a radio communication system according to a first embodiment of the invention, in which a consumption meter 1 communicates using two different radio frequency bands 6, 8.

[0030] After installation or replacement of the consumption meter 1, meter identification data is sent to a smartphone 2 using near field communication in an HF band 6. If the smartphone 2 is placed on or near to the consumption meter 1, common near field communication standards like RFID or NFC may be used to transfer such data from the consumption meter 1 to the smartphone 2 using electric power only from the battery in the smartphone 2, which, contrary to the battery in the consumption meter 1, may be easily recharged.

[0031] When the smartphone 2 is placed on or near to the consumption meter 1, a suitable smartphone application may be used to fetch the identification data from the consumption meter 1 and to locate the position of the smartphone 2 using built-in GPS facilities or other positioning systems and/or routines. In the configuration shown in fig. 1, this identification and location data is sent by the smartphone 2 to a concentrator 3 via a WiFi router 4 using common WiFi communication in a UHF band 7 for registration and activation of the

consumption meter 1.

[0032] The concentrator 3 is a unit, which is set up to collect data from a number of consumption meters 1 (for instance in a large building), which are registered and activated as belonging to the system, and to forward this data to a consumption registration and billing system 5 (not shown in fig. 1), for instance by working as a gateway to the Internet.

[0033] During normal operation of the consumption meter 1, consumption data are sent by radio communication in a first VHF/UHF band 8 directly from the consumption meter 1 to the concentrator 3.

[0034] In the second embodiment illustrated in fig. 2, the consumption meter 1 communicates by the same channels 6, 8 as shown in fig. 1. In this case, however, the smartphone 2 does not communicate with the concentrator 3 using WiFi. Instead, the smartphone 2 is physically moved (indicated by the punched arrow 9) from the consumption meter 1 to the concentrator 3 and the identification and location data of the consumption meter 1 is transferred to the concentrator 3 using near field communication 6 like the one between the consumption meter 1 and the smartphone 2. This requires, of course, that the concentrator 3 is able to communicate in the HF band as well.

[0035] Fig. 3 illustrates a third configuration of a radio communication system according to the invention. Again, the consumption meter 1 communicates by the same channels 6, 8 as shown in the previous figures.

[0036] Here, the smartphone 2 sends the identification and location data of the consumption meter 1 to a central consumption registration and billing system 5 using a second VHF/UHF radio frequency band 10, for instance via a common mobile telephone system such as GSM or a similar system. The consumption registration and billing system 5, in turn, forwards the identification and location data to the concentrator 3, which must collect the data from the consumption meter 1 for registration and activation of the consumption meter 1 with that concentrator 3.

[0037] The embodiment of the radio communication system illustrated in fig. 4 is a further development of the configuration shown in fig. 2. It is illustrated how the concentrator 3 may send collected consumption data from one or more consumption meters 1 to the consumption registration and billing system 5. This transfer of data may, for instance, be done using a third VHF/UHF radio frequency band or via the Internet 11.

[0038] Furthermore, it is illustrated how the smartphone 2 is in bidirectional communication with the consumption registration and billing system 5 using a second radio frequency band 10 as the one shown in fig. 3. In this way, it is possible for the consumption registration and billing system 5 to send a message back to the smartphone 2 that the consumption meter 1 has, in fact, been registered and activated with the correct concentrator 3 so that the application in the smartphone 2 can end the registration and activation procedure in a secure and safe way.

[0039] The above described configurations of the radio communication system are exemplary embodiments only and are not meant to be limiting or defining for the scope of protection. It will be obvious to the person skilled in the art how the system may be configured in various other ways within the scope of protection as defined by the below patent claims. For instance, two or more of the mentioned VHF/UHF radio frequency bands 8, 10, 11 may be identical or overlapping.

List of reference numbers**[0040]**

1. Consumption meter
2. Smartphone
3. Concentrator
4. WiFi router
5. Consumption registration and billing system
6. Near field communication in an HF band
7. WiFi communication in a UHF band
8. Far field communication in a first VHF/UHF band
9. Physical movement of smartphone
10. Far field communication in a second VHF/UHF band
11. Far field communication in a third VHF/UHF band or via the Internet

REFERENCES CITED IN THE DESCRIPTION

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liability in this regard.

Patent documents cited in the description

- WO2007135233A [0004]
- US6867707B [0005]

Patentkrav

1. Trådløst radiokommunikationssystem til forbrugsmålere (1), hvilket kommunikationssystem omfatter

5 - en eller flere batteridrevne forbrugsmålere (1), som er indrettet til at kunne kommunikere under anvendelse af et første sæt af radiofrekvensbånd, der omfatter et HF-bånd (6) og et første VHF/UHF-bånd (8),

10 - en eller flere mobile kommunikationsindretninger (2), som er indrettet til at kunne kommunikere under anvendelse af et andet sæt af radiofrekvensbånd, der omfatter i det mindste nævnte HF-bånd (6) og et andet VHF/UHF-bånd (7; 10), og

- et eller flere måleraflæsningssystemer (3), som er indrettet til at kunne kommunikere under anvendelse af et tredje sæt af radiofrekvensbånd, der omfatter i det mindste nævnte første VHF/UHF-bånd (8),

hvor

15 - mindst én af den ene eller de flere forbrugsmålere (1) er indrettet til at anvende nærfeltskommunikation i HF-båndet (6) til at overføre i det mindste måleridentifikationsinformation til mindst én af den ene eller de flere mobile kommunikationsindretninger (2),

20 - mindst én af den ene eller de flere forbrugsmålere (1) er indrettet til at anvende det første VHF/UHF-bånd (8) til at overføre i det mindste målerforbrugsdata til mindst ét af det ene eller de flere måleraflæsningssystemer (3), og

25 - det tredje sæt af radiofrekvensbånd omfatter nævnte HF-bånd (6) og/eller nævnte andet VHF/UHF-bånd (7; 10), og mindst én af den ene eller de flere mobile kommunikationsindretninger (2) er indrettet til at anvende nævnte HF-bånd (6) eller nævnte andet VHF/UHF-bånd (7; 10) til at overføre måleridentifikationsinformationen til mindst ét af det ene eller de flere måleraflæsningssystemer (3), og

hvor kommunikationssystemet er indrettet til at strømforsyne nærfeltskommunikationen mellem den ene eller de flere forbrugsmålere (1) og den ene eller de flere mobile kommunikationsindretninger (2) udelukkende fra et batteri af den ene eller de flere mobile kommunikationsindretninger (2).

5

2. Kommunikationssystem ifølge krav 1, hvor nærfeltskommunikationen er indrettet efter NFC- eller RFID-standarder som kendt inden for teknikken.

3. Kommunikationssystem ifølge et hvilket som helst af de foregående krav, hvor nævnte første VHF/UHF-bånd (8) er forskelligt fra nævnte andet VHF/UHF-bånd (7; 10).

4. Kommunikationssystem ifølge et hvilket som helst af de foregående krav, hvor det andet VHF/UHF-bånd (10) anvendes til kommunikation med et offentligt cellulært mobilkommunikationssystem.

15

5. Kommunikationssystem ifølge et hvilket som helst af de foregående krav, hvor den ene eller de flere mobile kommunikationsindretninger (2) er indrettet til at opnå placeringsdata om deres egne positioner.

20

6. Kommunikationssystem ifølge krav 5, hvor mindst én af den ene eller de flere mobile kommunikationsindretninger (2) er indrettet til at overføre måleridentifikationsinformation og nævnte placeringsdata til et eller flere af det ene eller de flere måleraflæsningssystemer (3).

25

7. Fremgangsmåde til registrering og drift af en batteridrevet forbrugsmåler (1) med et måleraflæsningssystem (3), hvilken fremgangsmåde omfatter følgende trin:

- registrering af forbrugsmåleren (1) hos måleraflæsningssystemet (3) ved hjælp af:

overførsel af en måleridentifikationsinformation af forbrugsmåleren (1) til en mobil kommunikationsindretning (2) fra forbrugsmåleren (1) under anvendelse af nærfeltskommunikation (6), og

5 overførsel af forbrugsmålerens (1) måleridentifikationsinformation til måleraflæsningssystemet (3) fra den mobile kommunikationsindretning (2) under anvendelse af nærfeltskommunikation (6) eller kommunikation i et andet VHF/UHF-radiofrekvensbånd (7; 10),

- drift af forbrugsmåleren (1) ved hjælp af:

10 overførsel af forbrugsdata af forbrugsmåleren (1) til måleraflæsningssystemet (3) fra forbrugsmåleren (1) under anvendelse af kommunikation i et første VHF/UHF-radiofrekvensbånd (8),

15 hvor trinnet til anvendelse af nærfeltskommunikation til overførsel af en måleridentifikationsinformation af forbrugsmåleren (1) til en mobil kommunikationsindretning (2) fra forbrugsmåleren (1) omfatter et trin til strømforsyning af nævnte nærfeltskommunikation udelukkende ved hjælp af et batteri af den mobile kommunikationsindretning (2).

20 8. Fremgangsmåde ifølge krav 7, hvor nævnte første VHF/UHF-bånd (8) er forskelligt fra nævnte andet VHF/UHF-bånd (7; 10).

9. Fremgangsmåde ifølge krav 7 eller 8, hvilken fremgangsmåde omfatter et trin, hvor den mobile kommunikationsindretning (2) opnår placeringsdata om sin position.

25 10. Fremgangsmåde ifølge krav 9, hvor den mobile kommunikationsindretning (2) overfører nævnte placeringsdata sammen med nævnte måleridentifikationsinformation til måleraflæsningssystemet (3).

DRAWINGS

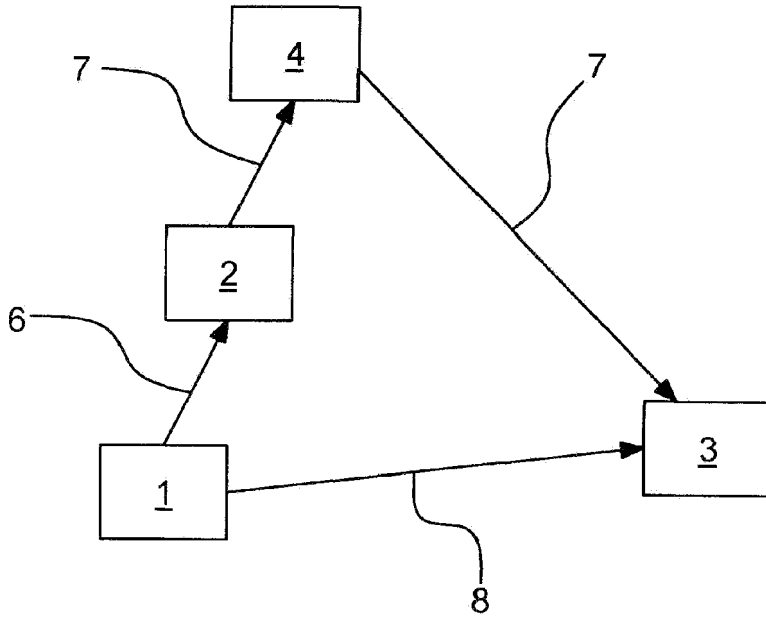


Fig. 1

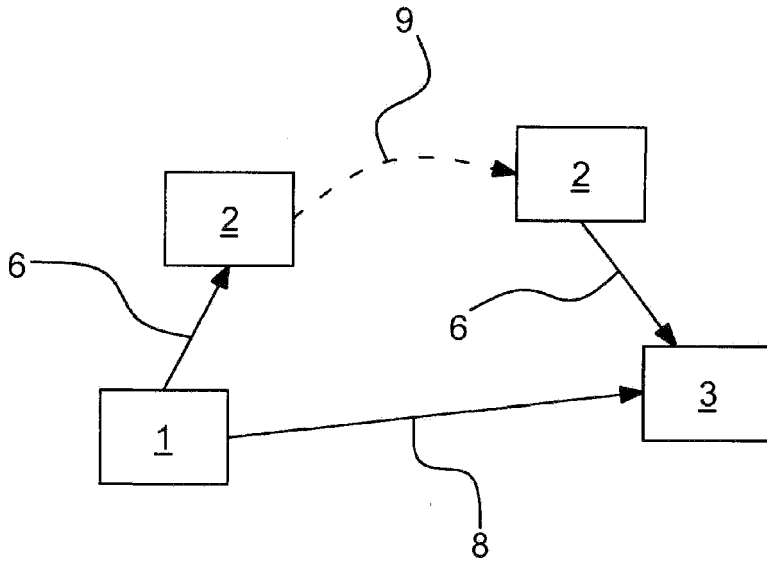


Fig. 2

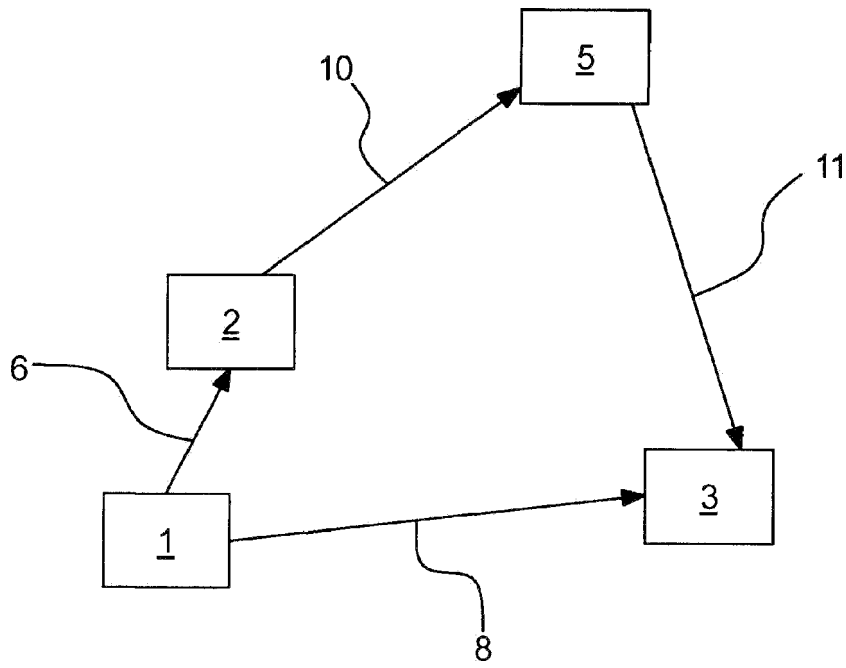


Fig. 3

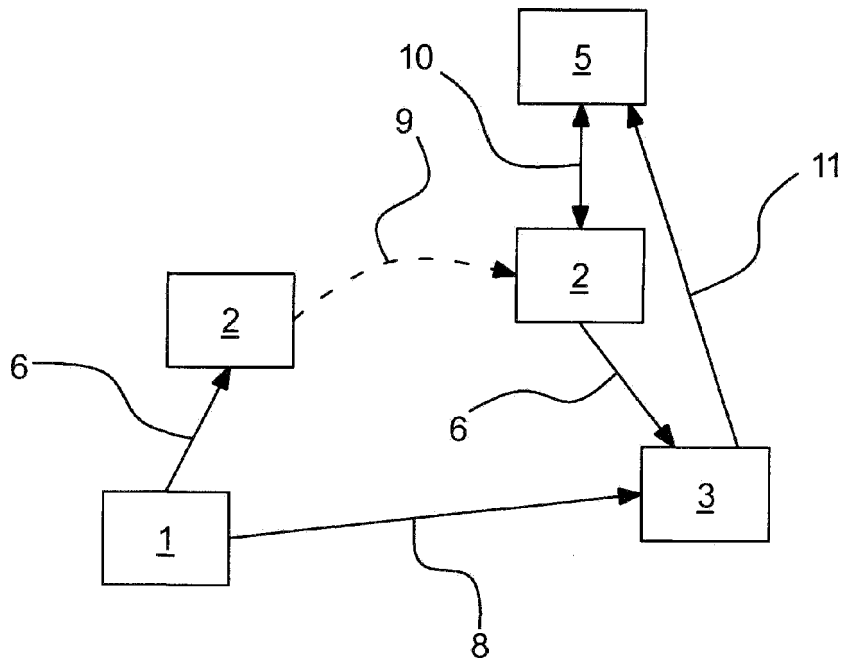


Fig. 4