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Bell

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(54) **MULTIPLE LINK DATA OBJECT CONVEYING METHOD FOR CONVEYING DATA OBJECTS TO WIRELESS STATIONS**

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(52) **U.S. Cl.** **455/41**; 455/411; 455/517
(58) **Field of Search** 455/41, 411, 566, 455/567, 410, 517; 380/247, 270

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Vcard and Vcalendar, Website HTTP://WWW.IMC.ORG/PDI/, Oct. 18, 1999.

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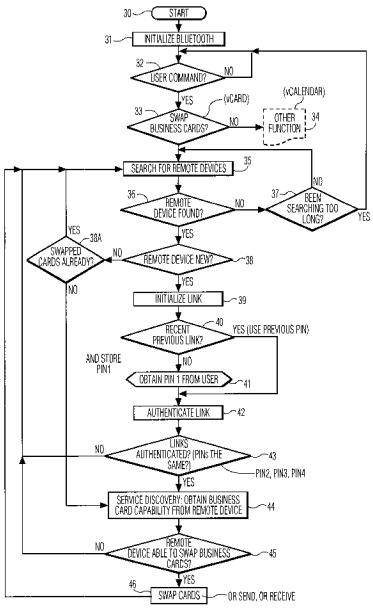
(57) **ABSTRACT**

A wireless system comprises a number of wireless stations for communication with each other through short-range wireless links. In a multiple link data object conveying method, in a data conveying session, a first short-range wireless link is set up between a first and a second wireless station of the wireless system. Upon setting up of the first short-range wireless link, first and second personal identification codes are respectively entered in the first and second wireless stations. Thereafter, a data connection through the first wireless link is only set up if the first and second entered personal identification codes are the same. If the data connection is set up the first personal identification code is stored for later use in the session, and the data object is conveyed through the first wireless link. Then, while using the stored first personal identification code, at least a subsequent short-range wireless link is set up from the first wireless station to a third wireless station. After checking whether the third wireless station returned the same personal identification code as the re-used first personal identification code, the same type of data object is conveyed through the subsequent wireless link.

18 Claims, 2 Drawing Sheets



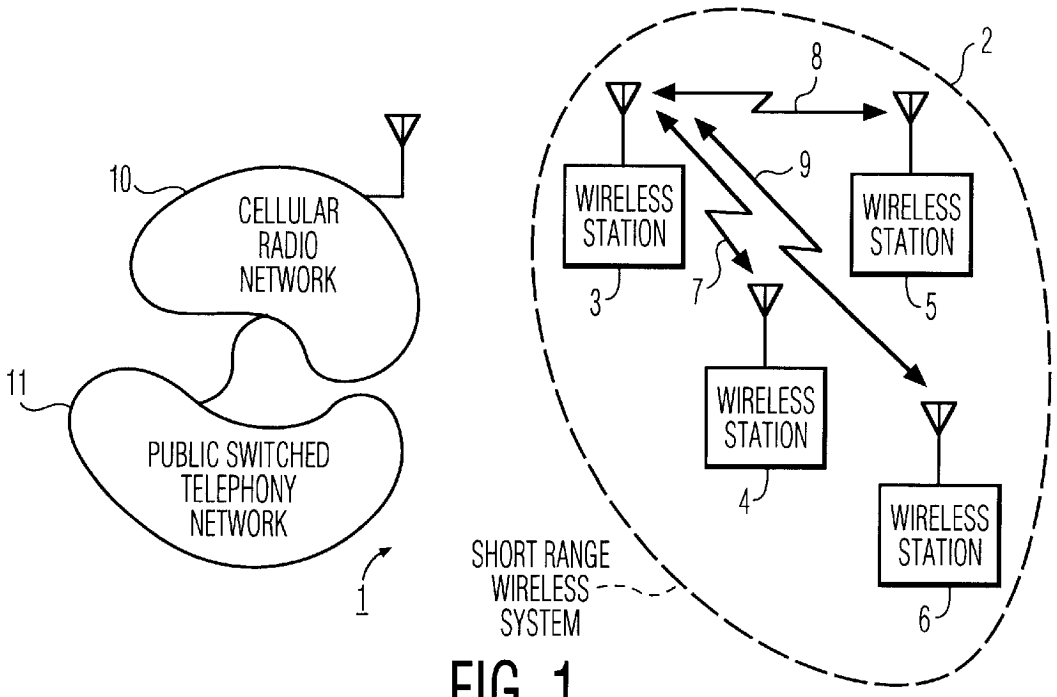


FIG. 1

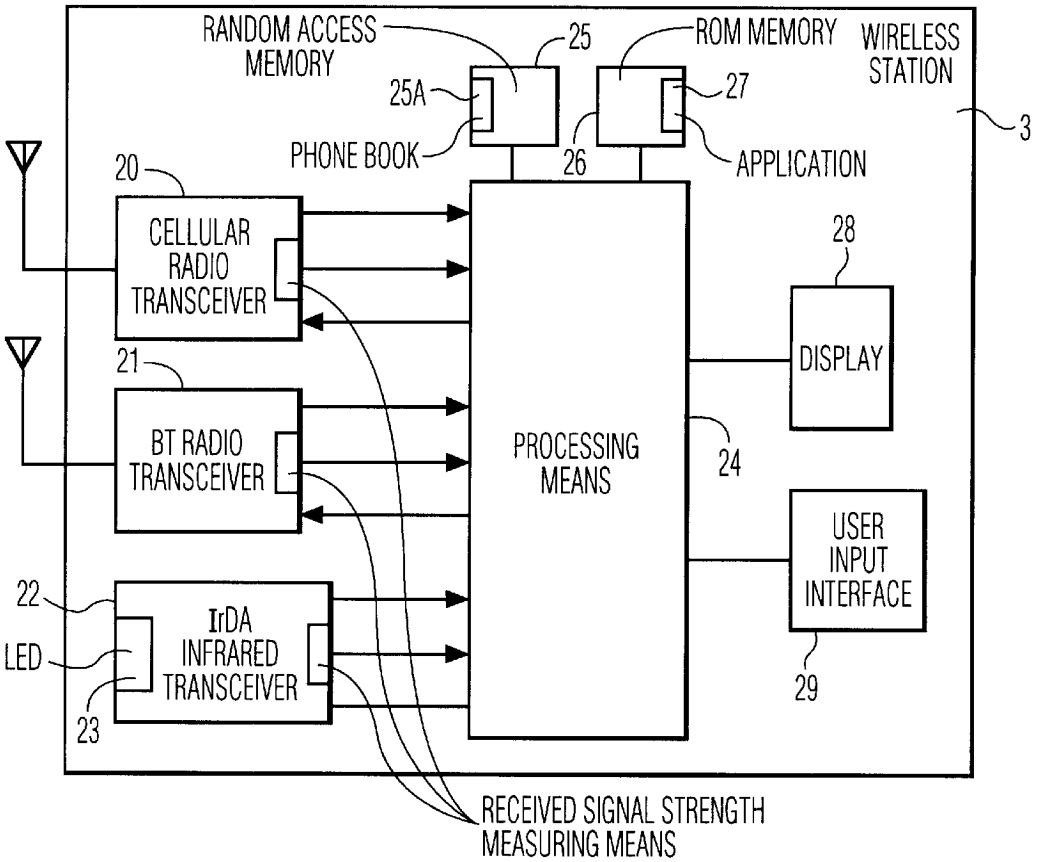


FIG. 2

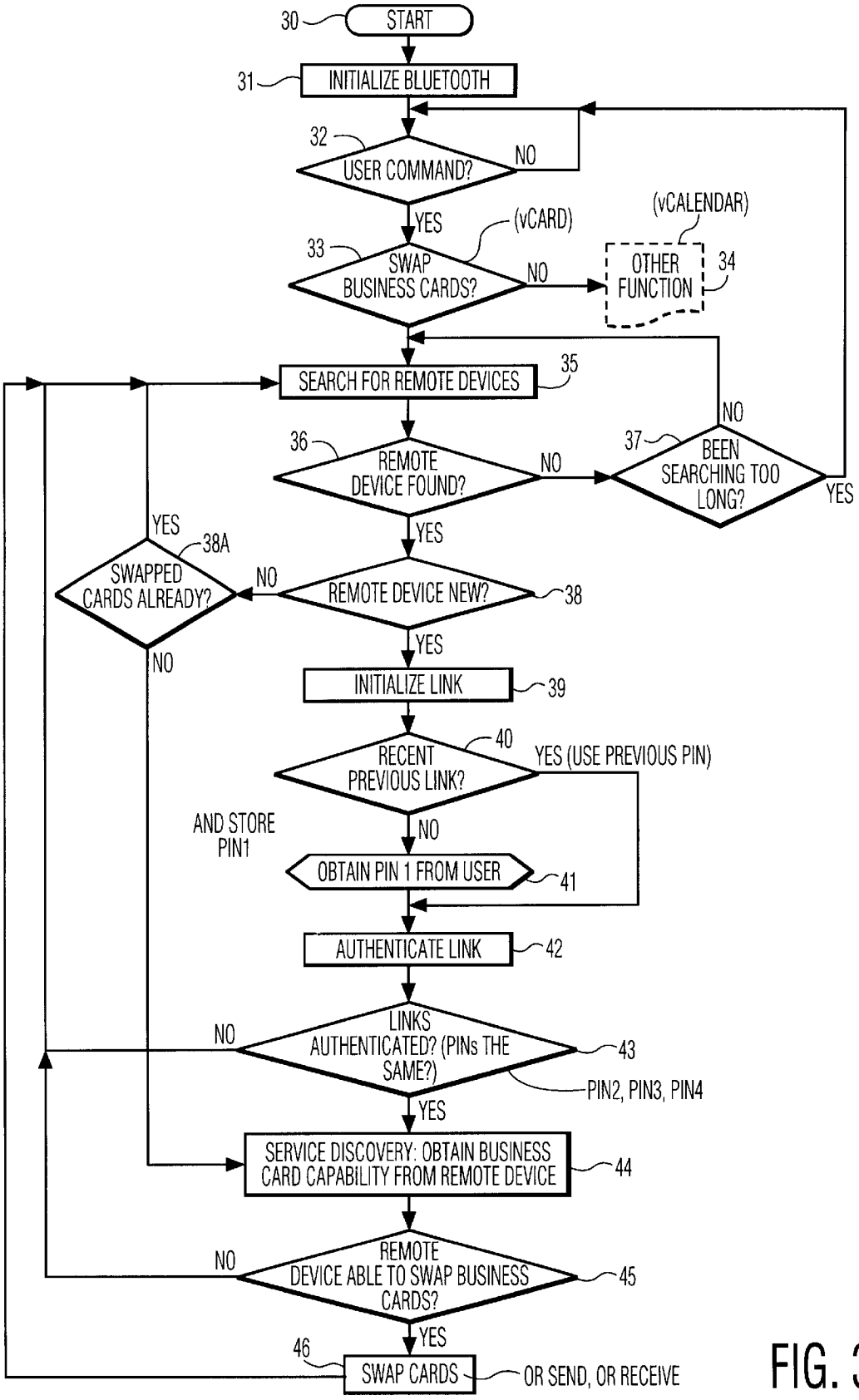


FIG. 3

MULTIPLE LINK DATA OBJECT CONVEYING METHOD FOR CONVEYING DATA OBJECTS TO WIRELESS STATIONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of conveying data objects to wireless stations through short-range wireless links such as radio links, infra-red links, or any other suitable wireless links or combinations of different types of wireless links. The short-range wireless links can be wireless links in accordance with the so-called Bluetooth Specification, or any other suitable short-range wireless link. The wireless stations can be cellular or cordless phones, personal computers, PDAs, laptops, palm pilots, or any other suitable portable devices.

The present invention further relates to a wireless system and to wireless stations for implementing the method.

2. Description of the Related Art

The well-known OSI, Open System Reference model of layers distinguishes seven layers, a physical layer, a data link layer, a network layer, a transport layer, a session layer, a presentation layer and an application layer. Depending on a particular application, several layers may be combined as a single layer. In accordance with the OSI reference model, the physical data flow between system entities occurs through all layers between entities, whereas the logical data flow is defined as a peer to peer communication between corresponding layers of the entities.

The Bluetooth Specification, "Specification of the Bluetooth System—Core", v1.0A, Jul. 26th, 1999, pp. 41–45 and 47, describes a short-range wireless system. In Bluetooth, the range of a wireless link is typically in the order of a few meters. On page 41, a general description of BT, Bluetooth, a short-range radio link, is given. On page 42, a BT piconet with masters and slaves is shown. On pages 43–45, the BT physical channel, with time slots, is shown. Page 45 describes types of links between masters and slaves, a master being a link initiator, and a slave being the device accessed by the master. In this respect, a master/slave relationship exists between devices when a Bluetooth link is established. Once a link has been established, a communication can be initiated by a client or by a server, a client/server relationship existing between applications of the devices involved in a link. In terms of Bluetooth, depending on the device initiating a Bluetooth link, either the server or the client is a master, the other one of the server/client then being a slave. In the server/client relationship, the client sends requests to the server, and the server responds to such requests. As described on page 47, information is exchanged through packets, e.g., using a serial port profile or a more complex object exchange profile as defined in Bluetooth.

The Bluetooth Specification, "Specification of the Bluetooth System—Profiles", v1.0A, Jul. 26th, 1999, pp., describes protocol profiles in Bluetooth. On page 26, a PIN, i.e., a passkey is described that is used to authenticate two BT devices to each other. The PIN is used in a so-called pairing procedure. Pairing is described on page 28. In a pairing procedure both users involved in a wireless link should enter the same PIN in the respective devices of the link. A Service Discovery Protocol is started to find the other one of the client/server pair. Upon the service discovery procedure, as defined on page 66, that is used to locate services that are available on or via devices in the vicinity of a BT enabled device, establishment procedures as defined on page 45 are performed. First a link establishment procedure is performed to establish a physical link between two BT devices. Then, a channel establishment procedure is performed to establish a BT channel, i.e., a logical link, between the two BT devices is established. Thereafter, a connection establishment procedure is performed to establish a connection between applications on the two BT devices. Between a connection request from one of the BT devices and a connection acknowledgement of the other BT device, an authentication procedure may be performed. On pages 336–348 Object Exchange profiles are described to be used by applications running on BT devices, such as Object Push and Object Pull devices. An object push profile can be used by a BT enabled mobile phone to push an object to another BT device. An object pull profile can be used by a mobile phone to pull an object from another mobile phone. With the object profiles push and pull, information such as business card information, calendar information, or any other useful information can be sent to, received from a BT device, or can be exchanged between BT devices, exchange being defined as a push of a business card followed by a pull of a business card. On page 346, object push features are described, such a phone book applications should support vCard, calendar applications that should support vCalendar, messaging applications that should support vMessage, and notes applications that should support vNote.

Instead of a short-range radio link, also other short-range links such as an infra-red link are known, e.g., the IrDA Standard as described in the IrOBEX Specification "IrDA Object Exchange Protocol", Version 1.2, Counterpoint Systems Foundry, Inc and Microsoft Corporation, Mar. 18, 1999. In the IrOBEX specification four OBEX commands are described that can be used to exchange data in a short-range infra red link, the so-called CONNECT, PUT, GET, and DISCONNECT operations. In Section 3.3 OBEX operations and opcode definitions are given, and more particularly Section 3.3.1 on page 23 describes the CONNECT operation, Section 3.3.2 on page 26 describes the DISCONNECT operation, Section 3.3.3 on pages 26 and 27 describes the PUT operation, and Section 3.3.4 on page 29 describes the GET operation. IrDA has been adapted to Bluetooth. In Bluetooth, corresponding commands are described, PUSH corresponding to PUT, and PULL corresponding to GET of the IrOBEX specification. On page 45 of the IrOBEX specification, examples are given of CONNECT, PUT, and GET client requests and server responses. A so-called vCard object in IrOBEX is defining a format of a business card that may include a name, telephone and fax numbers, e-mail addresses, and other types of information. On page 337 of said Bluetooth Specification—Profiles, referred is to the BT IrDA Interoperability Specification.

In the PCT patent application WO 99/29127, a method is disclosed for sending tagged information to a cellular telephone through a short message in a short message service. As described from page7, line 24 to page 8, line 18 of WO 99/29127, one type of short message is tagged with a header identifying the message as a standardized electronic business card. Such standardized electronic business cards are known as vCards as indicated above, and are described in more detail by Internet Mail Consortium.

vCard and vCalendar are further described on the website of the Internet Mail Consortium. vCard and vCalendar are registered trademarks of the Internet Mail Consortium.

In the PCT patent application WO 97/04602 a method for use in a cellular telephone is disclosed in which PIN, Personal Identification Number, usage is reduced in order to

reduce the chance to intercept PINs on an air interface between the cellular telephone and a cellular telephony network. In this method, a user or subscriber of the cellular telephone is only required to enter a PIN when a call is made to a telephone number not previously stored in a separate calling or contact list of the cellular telephone, i.e., a call setup routine of the cellular telephone then bypasses the PIN request and connects such calls. See WO 97/04602, page 2, lines 5–25.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a simple multiple link data object conveying method for use in a wireless system of a type in which wireless links are authorized through matching personal identification codes, without tedious and repetitious entering of personal identification codes for individual links.

It is another object of the invention to provide such a method wherein for all wireless links the same data object conveying task is performed.

It is still another object of the invention to perform the data object conveying task for all involved wireless links within a predetermined time, particularly within a time period in the order of minutes or less.

It is still another object of the invention to use an agreed personal identification code for all wireless links involved in a data object conveying task as agreed upon by users of the wireless stations involved in the wireless links.

It is still another object of the invention to convey, i.e., receive, transmit, or exchange, data objects of different types such as virtual business cards, virtual calendars, virtual notes, or any other suitable data objects.

In accordance with the invention, an application driven multiple link data object conveying method is provided, for use in a wireless system comprising a plurality of wireless stations for communicating with each other through short-range wireless links, said method comprising:

setting up a first short-range wireless link between a first and a second wireless station, while entering a first personal identification code in said first wireless station and a second identification code in said second wireless station, and only establishing a data connection through said first short-range wireless link between said first and second wireless stations when said first and second personal identification codes are the same;

upon a successful establishment of said data connection, running an application in one of said first and second wireless devices, said application initiating a first data object conveying task between said first and second wireless station;

through said application at least setting up a subsequent short-range wireless link to a third wireless station, while, using a stored personal identification code that is the same as said first and second personal identification code, and, after checking whether said third wireless station returns a personal identification code that is the same as said stored personal identification code, initiating performance of a further data object conveying task between said first and third wireless stations.

In a preferred embodiment, the same data object conveying task is performed for all wireless links involved in a conveying session, a data object being a virtual business card, for instance. In such a data object conveying task, some wireless stations may only receive or transmit business card information, and other wireless stations may exchange business card information.

Typically, a data object conveying task is ended, either manually or automatically in the order of thirty seconds after the last session between the wireless stations involved.

The method can be initiated manually, but also automatically, when two or more wireless stations to become involved in a data object conveying session make requests for such a session within a short period of time, within thirty seconds, for instance.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a wireless system with a number of wireless stations in accordance with the present invention.

FIG. **2** shows a functional block diagram of a wireless station in accordance with the present invention.

FIG. **3** shows a flow chart to illustrate a method in accordance with the present invention.

Throughout the figures the same reference numerals are used for the same features.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** shows a wireless system **1** including a short-range wireless system **2** with a number of wireless stations **3**, **4**, **5**, and **6**. Shown is the wireless station **3** communicating with the wireless stations **4**, **5**, and **6** through respective short-range multiple wireless links **7**, **8**, and **9**. In addition thereto, the wireless station can be configured to communicate with a cellular radio network **10**, or any other suitable network. The shown cellular radio network **10** may be coupled to a public switched telephony network **11**. The wireless stations **3**, **4**, **5**, and **6** can also be configured for short-range wireless communication only. Preferably, through the wireless links **7**, **8**, and **9** air interface protocols are performed in accordance with said Bluetooth Specification. Alternatively, other suitable short-range wireless link protocols may be used such as according to the so-called HomeRF Standard. The short-range wireless links **7**, **8**, and **9** can be radio links, infrared links, or any other suitable wireless links, or combinations thereof.

FIG **2**. shows a functional block diagram of the wireless station **3** in accordance with the present invention. The wireless stations **4**, **5**, and **6** are similar in construction and operation. The wireless stations can be cellular phones, personal computers, PDAs, or any other suitable portable device configured and programmed to implement the present invention. The wireless station **3** comprises a cellular radio transceiver **20**, a Bluetooth (BT) radio transceiver **21**, and an IrDA infrared transceiver **22** with a Light Emitting Diode (LED) **23** for transmitting and receiving modulated infrared signals. The transceivers **20**, **21** and **22** comprise receive and transmit circuitry, including mixers, modulators, demodulators, analog-to-digital converters, and digital-to-analog converters so that the transceivers can transmit digital signals generated by processing means **24** and can provide digital signals to the processing means **24**. Such transceiver circuitry is well known and is not shown in detail here. The BT transceiver **21** is configured to operate in accordance with said Bluetooth Specification and the IrDA transceiver **22** is configured to operate in accordance with said IrDA Specification. The wireless station **3** further comprises a random access memory (RAM) **25** for storing volatile data with a memory part **25**A for storing non-volatile data, a ROM-memory **26** comprising an application **27**, a display **28**, and a user input interface **29** such as a keyboard or other suitable input means and display control

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