



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.09.2002 Bulletin 2002/38

(51) Int Cl.7: **G07B 15/02**

(21) Application number: **01610105.7**

(22) Date of filing: **10.10.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **13.03.2001 DK 200100418**

(71) Applicant: **TELEFONAKTIEBOLAGET LM
ERICSSON**
126 25 Stockholm (SE)

(72) Inventors:
• **Andersen, Carsten B.**
9260 Gistrup (DK)
• **Bogeskov, Allan**
9000 Aalborg (DK)
• **Skubic, Janez**
16375 Hässelby (SE)

(74) Representative: **Sigh, Erik et al**
Hofman-Bang Zacco A/S
Hans Bekkevolds Allé 7
2900 Hellerup (DK)

(54) **A method of automatic billing for a person or an object being transported, by a means of transportation**

(57) The invention provides a method of automatic billing a person or an object such as cargo or a piece of luggage being transported, by a means of transportation, a distance from a station of departure to a station of destination, where the travelling person or object has an individual device that can be wirelessly detected and that represents the person or the object. Preferably, the individual device is a Bluetooth device such as a mobile phone, a personal digital assistant (PDA) or other com-

munication device based on short-range radio signals. When the person or object including the individual device is on the means of transportation, the individual device is automatically detected, and the presence board of the individual device is taken to mean that the person or object is also on board. A system checks that billing can actually be performed based on the detected individual device, and the person is preferably asked to confirm, through wireless communication using the individual device, that billing can take place.

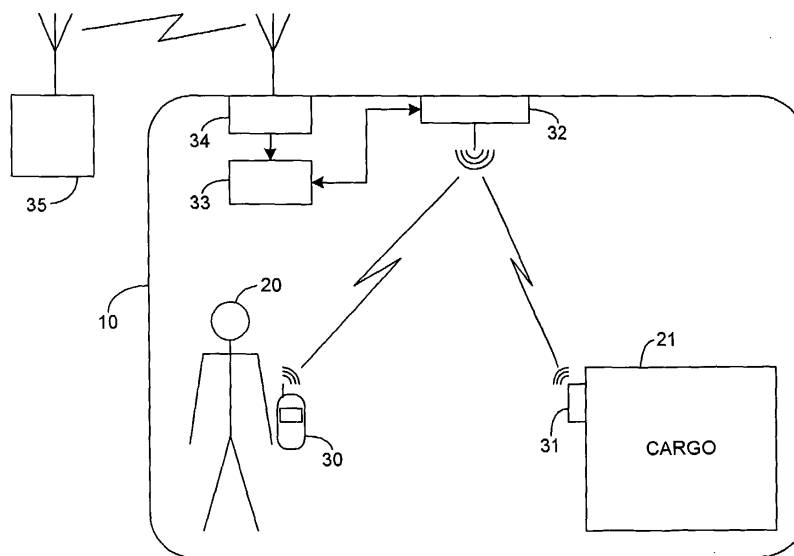


Fig. 2

Description

Background of the invention

[0001] The invention relates to methods of billing a person or an object such as cargo or a piece of luggage being transported, by a means of transportation, a distance from a station of departure to a station of destination.

[0002] Systems and methods of prepaid travelling and transportation are known, where a passenger buys a ticket in advance, or where the transportation fare for the cargo or luggage is paid in advance.

[0003] Systems and methods of automatic billing are also known. In such known methods the travelling person has eg a personal credit card, which he uses in connection with entering the means of transportation. The credit card can be a general-purpose credit card or it can represent an account, which the travelling person holds with the transporting organisation. This corresponds to the system of prepaid travelling, where the payment is made or confirmed in the "last minute".

[0004] Systems are also known where a travelling person enters the means of transportation such as a train, and after the train has left the station of departure, an officer from the transporting organisation will go through the train and sell tickets to passengers, who have just entered the train, and the passengers may pay the fare in cash or using a credit card or other accepted means of payment.

Summary of the invention

[0005] The invention provides a method of automatic billing a person or an object such as cargo or a piece of luggage being transported, by a means of transportation, a distance from a station of departure to a station of destination, where the travelling person or object has an individual device that can be wirelessly detected and that represents the person or the object. Preferably, the individual device is a Bluetooth device such as a mobile phone, a personal digital assistant (PDA) or other communication device based on short-range radio signals. When the person or object including the individual device is on the means of transportation, the individual device is automatically detected, and the presence board of the individual device is taken to mean that the person or object is also on board. A system checks that billing can actually be performed based on the detected individual device, and the person is preferably asked to confirm, through wireless communication using the individual device, that billing can take place.

[0006] The invention makes it possible for travelling persons to get on board the means of transportation without having to show a ticket, which might possibly have to be checked for its validity etc. All such formalities are time consuming. The invention makes it possible for passengers to get on board the means of transportation

without having to spend time on such time consuming formalities. The time the means of transportation will have to spend at stations of departure will thereby be reduced, since the presence of the passengers in the means of transportation can be detected after the departure from the station of departure.

[0007] The method makes it possible to bill automatically for the journey from a station of departure to a station of destination independent of the chosen route and of stops at intermediate stations. At any intermediate station passengers may disembark the means of transportation and terminate their journey, and new passengers may embark and start their journey.

[0008] The invention can be used in virtually any means of transportation: trains, buses, taxis, ships, airplane etc. and in any combination of several means of transportation. Passengers arriving eg by airplane at an airport will often have to travel further by either by a connecting flight or by train, bus or taxi, and the automatic billing method of the invention can be implemented to automatically bill for a combination of different means of transportation. An airport where a sub-distance travelled by airplane starts or ends will thus just be an intermediate station.

[0009] Automatic billing with the method of the invention can also be performed for a person's visit to eg a museum, a theatre, an amusement park, a tourist attraction or other fixed installation or facility, where the person's presence, like in the means of transportation, is detected wirelessly by means of his or her individual device representing the person. The billing of such visit can be combined with the billing for person's transportation in connection with his or her visit to the fixed installation. This makes it easy to make a correct billing for special offers where eg a visit to a fixed installation in combination with transportation to the installation is offered at a special price. Use of combinations of means of transportation can automatically be billed correctly. Examples are special offers such as travels at special times, on special days or a special combination of means of transportation, possibly in combination with a visit to a fixed installation.

[0010] The individual device representing the person or the object being transported preferably uses short-range radio signals for communicating with the equipment in the means of transportation for detecting the presence of the device, but other communications techniques can also be used, such as magnetic or inductive detection and infrared communication. When using short-range radio signals for communicating the individual device is preferably a device using the standard Bluetooth protocol. Such devices using the standard Bluetooth protocol are here referred to as Bluetooth devices. Examples of Bluetooth devices are mobile phones, personal digital assistants (PDA's), electronic watches, laptop computers etc.

[0011] Naturally, the wireless communication with the individual device must comply with applicable safety

regulations. Eg onboard airplanes safety regulations usually do not allow the use of mobile phones, because the long-range radio communication of a mobile phone might interfere with the communication and navigation of the airplane. Thus, when the means of transportation is an airplane, and a mobile phone with Bluetooth short-range communication is used as the individual device, it should preferably be possible to switch off the functions or circuits of the mobile phone that might disturb eg the communication and navigation of the airplane, which is the traditional long-range communication of the mobile phone, while it should be possible to keep the Bluetooth communication of the mobile phone active.

[0012] The billing method of the invention can be used in conjunction with any bonus program of the transporting organisation. Travelling persons will be given a great degree of freedom in planning journeys, and re-routing can be done with very short notice. Final billing can be performed based on a person's total travelling and other activities in a predefined period, eg one month or one year, possibly in accordance with a bonus program.

Brief description of the drawings

[0013]

Figure 1 shows two possible routes for travelling from a station of departure to a station of destination, and

Figure 2 shows a means of transportation using a preferred embodiment of the invention.

Detailed description of the invention

[0014] In figure 1 is shown a station of departure A and a station of destination B. An unbroken arrow from the station of departure A to the station of destination B indicates the direct route to be travelled by a means of transportation. An alternative route from A to B makes stops at intermediate stations C and D, whereby the distance AB travelled from A to B is divided into sub-distances AC, CD and DB. A station is here defined as a geographical location defining a distance or a sub-distance to be travelled by a means of transportation and where a journey travelling the defined distance or sub-distance can be started or terminated.

[0015] Figure 2 shows a cross section through a means of transportation such as a train 10 that can travel the distance AB or the combination of sub-distances AC, CD and DB in figure 1.

[0016] Situated within the train is a person 20 carrying a mobile phone 30, and a piece of cargo 21 equipped with a cargo tag 31. The mobile phone 30 and the cargo tag 31 are both capable of communicating using the standard Bluetooth protocol, and each of them has an individual Bluetooth identification code. Also within the train 10 is a Bluetooth station 32, which in the shown

embodiment is mounted onto the ceiling of the train, but a handheld Bluetooth station could also be used. A processor 33 is coupled to the Bluetooth station 32 so that bi-directional wired or wireless communication between the processor and the Bluetooth station 32 is possible.

[0017] At any suitable time, typically related to time of departure from the station of departure A, the processor 33 causes the Bluetooth station 32 to interrogate for the presence of enabled individual Bluetooth devices in the train, such as mobile phones 30 and cargo tags 31. Enabled Bluetooth devices in the train will thereby be caused to respond by transmitting an individual Bluetooth device identity code. When the processor receives the Bluetooth device identity codes, a verification ensuring billing of the correct account is performed, and a message may be sent to the mobile phone 30 asking the person 20 to confirm the billing of his account. If the person is travelling on the direct route AB and terminating the journey at the station of destination B, then the billing is done based on the detection of the presence of the person (or rather his Bluetooth mobile phone 30) in the train.

[0018] If the person travels from the station of departure A via the intermediate stations C and D to the station of destination B, then the presence of his Bluetooth mobile phone 30 is detected on each of the sub-distances, and the billing is performed for the total distance travelled. In practice, final billing will not be performed until the travelling person has left the train and his personal Bluetooth device is no longer detected as present in the train.

[0019] On board the train is also a receiver 34 for receiving geographical information allowing the determination of the distance or sub-distance being actually travelled. The receiver can receive such information from a satellite based global positioning system (GPS) 35 or from a transmitter located along the rails of the sub-distance. Alternatively, the receiver 34 can receive eg GSM cell information identifying the cell in the network in which the mobile phone is operating. In a simpler from the geographical information can be input by a train officer using a keyboard, or the processor can be pre-programmed with the entire time table including intermediate stations.

[0020] Typically, a sequence of actions involving the method of the invention could include all or some of the following steps.

- After possible security check at the station of departure a passenger enters the means of transportation with his or her Bluetooth device enabled, or the cargo or luggage is moved into the luggage or cargo compartment of the train with the attached Bluetooth cargo tag enabled.
- The train leaves the station of departure.
- The billing system detects that the train has left the station of departure.
- The billing system detects the global position of the

train with an accuracy sufficient to identify the sub-distance actually being travelled.

- The billing system initiates a procedure for detecting the presence of Bluetooth devices on the train.
- A database in the billing system is updated with detected Bluetooth devices.
- For new passengers, ie passengers not previously detected on the train, the most recently visited station will be recorded as their station of departure.
- For passengers no longer detected on the train the most recently visited station will be recorded as their station of destination.
- When leaving the train the passenger may choose to continue by another means of transportation, eg a bus or an airplane, having a billing system that detects his or her presence in the new means of transportation and records corresponding information.
- The recorded information can be post processed in situations where the passenger has an arrangement with the carrier such as a bonus program.
- A request for signature or approval of the billing can be sent to the Bluetooth device for electronic signature. Approval of the billing by electronic signature may possibly have to be performed for every sub-distance and for every fixed installation visited.
- Final billing is performed based on the total amount of recorded information.

References

[0021]

[1] The Official Bluetooth Website:
<http://www.bluetooth.com/developer/specification/core.asp>

[2] Brent A. Miller, Chatschik Bisdikian: Bluetooth Revealed, Prentice Hall PTR, Prentice-Hall, Inc., Upper Saddle River, NJ 07458, USA, 2000. ISBN 0-13-090294-2.

Claims

1. A method of automatic billing for a person or an object being transported, by a means of transportation, a distance (AB) from a station of departure (A) to a station of destination (B), the method comprising
 - wirelessly determining the presence, in the means of transportation, of an individual device representing the person or the object being transported by the means of transportation,
 - with the person or the object present in the means of transportation, determining the distance actually being travelled by the means of

transportation,

- providing price information for the actual distance travelled by the person or the object, and
- based on the price information, billing for the distance travelled by the person or the object.

2. A method according to claim 1, **characterized in that**

- the distance between the station of departure (A) and the station of destination (B) comprises at least two sub-distances (AC, CD, DB) with at least one intermediate station (C, D) between sub-distances,
- the presence of the person or the object is determined individually for each sub-distance,
- price information is provided for the total distance the person or the object is transported.

3. A method according to any one of claims 1-2, **characterized in that** the wireless determination of the presence of the person or the object uses communication devices based on short-range radio signals.

4. A method according to claim 3 **characterized in that** the communication devices communicate using the standard Bluetooth protocol.

5. A method according to any one of claims 1-4, **characterized in that** the distance actually being travelled by the means of transportation is determined using a satellite based global positioning system (GPS).

6. A method according to any one of claims 1-5, **characterized in that** the distance actually being travelled by the means of transportation is determined using information provided from ground based transmitters related to the distance being travelled.

7. A method according to any one of claims 1-6, **characterized in that** the distance actually being travelled by the means of transportation is determined using a predefined time schedule.

8. A method according to any one of claims 1-7, **characterized in that** the distance actually being travelled by the means of transportation is determined using inputs from a person operating the means of transportation.

9. A method according to any one of claims 2-8, **characterized in that** sub-distances are travelled by different means of transportation.

10. A method according to any one of claims 2-9, **characterized in that** sub-distances travelled are oper-

ated by different operators.

11. A system for automatic billing for a person or an object being transported, by a means of transportation, a distance (AB) from a station of departure (A) to a station of destination (B), the system comprising
- means for wirelessly determining the presence, in the means of transportation, of an individual device representing the person or the object being transported by the means of transportation,
 - means for determining the distance actually being travelled by the means of transportation,
 - means for providing price information for the actual distance travelled by the person or the object, and
 - means for billing, based on the price information, for the distance travelled by the person or the object.

25

30

35

40

45

50

55

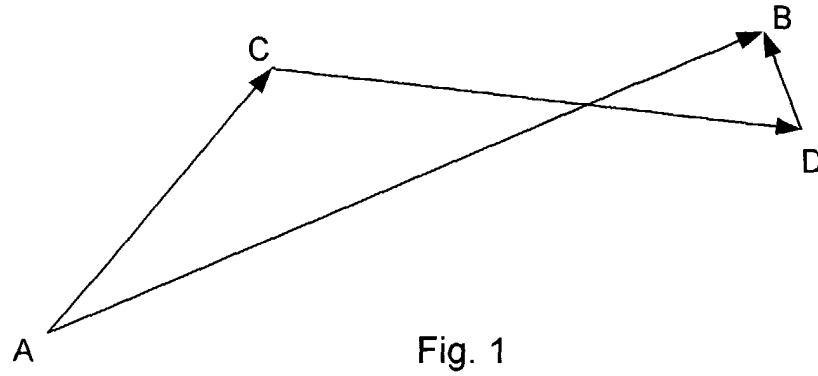


Fig. 1

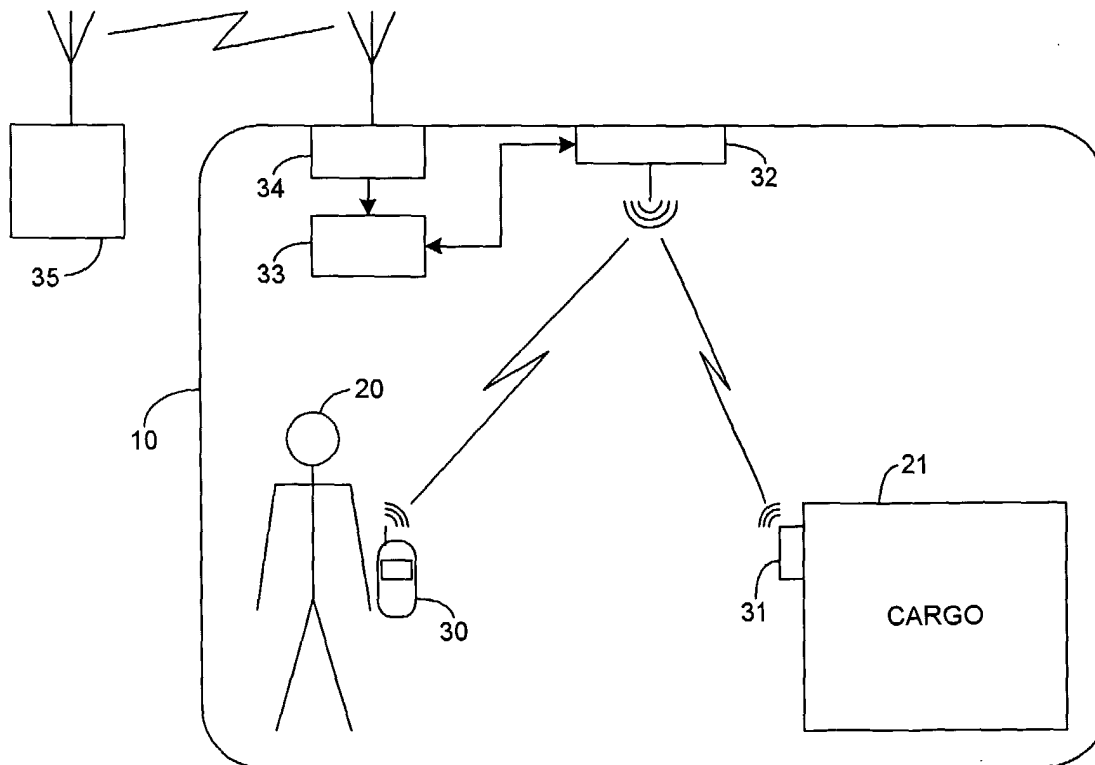


Fig. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 61 0105

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 01 03075 A (RITTER RUDOLF ;SWISSCOM AG (CH)) 11 January 2001 (2001-01-11) * page 6, line 19 - page 9, line 16 * * page 11, line 3 - line 18 *	1-11	G07B15/02
X	EP 0 465 456 A (REGIONALE WALLONNE DU TRANSPOR) 8 January 1992 (1992-01-08) * the whole document *	1,2,11	
A	EP 0 848 360 A (BRITISH TELECOMM) 17 June 1998 (1998-06-17) * column 6, line 8 - line 56 *	1-11	
P,X	WO 01 69540 A (SCHEEPSMA LEONARD ;ERICSSON TELEFON AB L M (SE)) 20 September 2001 (2001-09-20) * page 4, line 3 - page 9, line 30 *	1,11	
A	HAARTSEN J: "BLUETOOTH - THE UNIVERSAL RADIO INTERFACE FOR AD HOC, WIRELESS CONNECTIVITY" ON - ERICSSON REVIEW, ERICSSON. STOCKHOLM, SE, no. 3, 1998, pages 110-117, XP000783249 ISSN: 0014-0171 * the whole document *	4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			G07B H04Q
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 12 July 2002	Examiner Lavin Liermo, J
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			

EPO FORM 1503 03.82 (P04C01)

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

EP 01 61 0105

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-07-2002

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0103075	A	11-01-2001	WO 0103075 A1	11-01-2001
			AU 4495199 A	22-01-2001
			EP 1192602 A1	03-04-2002
EP 0465456	A	08-01-1992	BE 1003705 A3	26-05-1992
			EP 0465456 A1	08-01-1992
EP 0848360	A	17-06-1998	EP 0848360 A1	17-06-1998
WO 0169540	A	20-09-2001	NL 1014655 C2	25-09-2001
			AU 4484401 A	24-09-2001
			WO 0169540 A1	20-09-2001
			NL 1014655 A1	21-09-2001