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(54) Method for tracking and tracing goods

(57) A method for tracking and tracing goods having a communication set (Boxy) packed along with them, which communication set is capable of determining, on the basis of information obtained from public communication networks and information on the planned transportation route, whether a predetermined deviation from the planning is exceeded. An observed exceeding event is reported via the communication network to the central planning computer, which optionally sends back an alternative planning. The actual position of the goods is determined on the basis of transmitter identification codes of the communication network. The Boxies can communicate via a local communication channel to exchange data and to determine which Boxy is located in the most favorable position to take onto itself the reporting to the central planning computer.

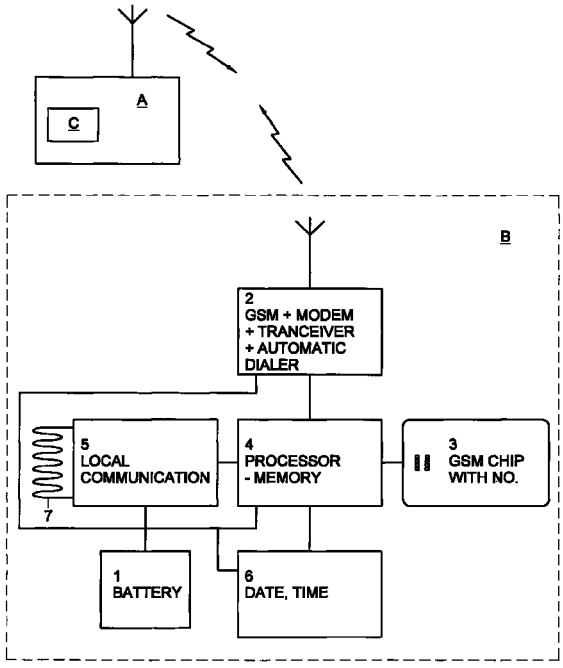

Fig. 1

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Description

[0001] In the transport of freight, such as, e.g., air-freight, where the goods to be transported generally represent a high value, there is a need for a method which makes it possible to follow, and if necessary trace, the transported goods.

[0002] Solutions for this in the form of computer software enabling transport planning and guidance are available. However, in the event of deviations from the planned routes and schedules, it is often impossible to trace the actual location of the goods.

[0003] The delays that occur in the transportation of goods are often caused by poor communication between the different changeover points and the central computer system. Here, the human factor plays an important role, due to which, for instance, goods that sustain delay are not reported to the central network.

[0004] The object of the present invention is to provide a solution to this problem. According to the invention, a method for tracking and tracing goods being transported is characterized in that at least one communication set is packed or linked together with the goods, which communication set comprises memory means in which, prior to transport, information about the planned transportation route along with at least one associated timeframe is stored, and which communication set is further arranged for wirelessly receiving information from a public or other communication network and for determining, on the basis of that information, whether a predetermined deviation from the planned transportation route and/or the associated timeframe is exceeded, and, if such deviation is exceeded, for transmitting via said public or other communication network a corresponding message to a central apparatus where the transport of the goods is planned and monitored. A system for practicing a method according to the invention is characterized by a central planning computer and a number of mobile communication sets, the planning computer and the mobile communication sets being arranged for wireless communication with each other via a communication network, the mobile communication sets comprising a memory for storing transportation route information in the form of identification codes or fingerprints of transmitters of the communication network that are located along the transportation route, and associated timeframes, as well as receiving means for receiving the identification codes or fingerprints, and comparator means for comparing the received identification codes or fingerprints and the associated timeframes with each other, and transmitting means for transmitting a message to the central planning computer via the communication network when a predetermined deviation is exceeded.

[0005] It is noted that U.S. Patent 5,751,245 discloses a system for following trucks or shipping containers, utilizing communication devices mounted on the trucks or shipping containers. These known communication devices, however, have separate locating means arranged for cooperation with GPS satellites or a Loran-C navigation system, and the like. Such separate locating means, however, are not utilized according to the present invention, because locating occurs on the basis of the signals provided by the network which is used for the communication anyway.

[0006] In the following, the invention will be further described with reference to the accompanying drawing.

Figure 1 shows a block diagram of an example of a system according to the invention.

[0007] A system for tracking and tracing transports of goods according to the invention is at least partly based on utilization of public or other communication infrastructure, such as, e.g., the so-called Global System Mobile (GSM) wireless telephone network, which is spread worldwide over more than 80 countries, or any other cellular network. According to the invention, valuable freight shipments are provided with a communication set B which will also be referred to as 'Boxy' in the following description, by analogy with the so-called Handy for wireless telephone traffic through the GSM network.

[0008] A Boxy according to the invention is an apparatus having a part of the functions of a GSM telephone set or similar telephone set, which is packed together with more expensive (air) freight, in order to be able to trace the goods along the transportation route to be traveled from source to destination.

[0009] In areas that are partly or wholly covered by a GSM network, the Boxy is capable of determining whether a predetermined deviation from the planned transportation route and schedule is exceeded. The Boxy is capable of detecting when the planned transportation times, in relation to the locations, are exceeded by a predetermined amount. The Boxy then contacts autonomously a central office A via, for instance, the GSM network, to report the delay. At the central office, for instance a central computer C can search for a modified planning and send it back to the Boxy, or instruct the Boxy in question not to communicate any further reports.

[0010] In this way, delays or changes in the route will be known to the central computer at a very early stage, so that customers can be informed at an early stage about the delays to be expected. Also, alternative transportation possibilities can be explored and initiated at an early stage.

[0011] An example of a Boxy according to the invention contains as functional modules, as schematically indicated in Figure 1, a battery module 1, a GSM transmitter/receiver with modem and automatic dialer 2, a GSM chip module 3 of the provider having a GSM number, a processor with memory 4 for logging transport planning and route, means 5 for local communication between one or more Boxies, and a clock module

with date and time 6. The means 5 can comprise, for instance, a transmitting/receiving coil 7, which, if desired, can also serve as an interface for storing route information and the like via the means 5 in the memory in module 4.

[0012] The dimensions of a Boxy are comparable to those of a small GSM telephone set.

[0013] The tracing of the routes traveled is done by the Boxy with the aid of GSM transmitter identification codes, which are conventionally transmitted periodically or continuously and which are received underway and stored in the memory of the Boxy, or with the aid of a so-called fingerprint of these transmitter identification codes, without the meaning of this fingerprint being known. The transmitter identification codes, or fingerprints thereof, as far as they are known, are loaded from the central computer into the Boxy at the beginning of the transport. Unknown GSM transmitter identification codes are received underway and, following transport, also passed on to the central computer.

[0014] In this way, the system is self-learning and does not need to be supplied beforehand with the transmitter identification information, which in fact is often not known in advance.

[0015] In the tracking and tracing procedure using a Boxy, the transportation planning and possibly product information are loaded into the Boxy, whereby the memory 4 of the Boxy is supplied with times, permissible margins, and GSM transmitter identification codes to be expected. Subsequently, en route, the Boxy, depending upon the planning, listens to the GSM transmitter identification codes, which are compared with the expected codes and the timeframe that was planned for them. It the planned timeframe is exceeded, this is reported to the central office (the central computer) (via the GSM network or similar network) only if the Boxy, wholly or partly outside the planned timeframe, receives a transmitter ID code which is on the pre-inputted list, and if this transmitter identification code has been registered during a minimum period of time of, e.g., 30 minutes, for instance to prevent communication during a flight.

[0016] Communication during a flight can also be prevented, however, by having a communication system on board of the airplane transmit a suitable blocking signal which can be received, for instance, via the module 5, 7 of the Boxy.

[0017] All transmitter ID codes that are received by a Boxy and are not on the pre-inputted list, are stored in the memory of the Boxy together with the timeframe of the reception of these codes.

[0018] At the destination of the goods, all information stored in the Boxy is read and passed on to the central computer system. If transportation has proceeded as planned, this extra information can be used for subsequent shipments along the same route.

[0019] Because it may happen, when the Boxies are packed, that one or more Boxies in a shipment cannot communicate with a GSM network receiver/transmitter, provisions have been made in the Boxy, in accordance with the invention, to enable local communication between the Boxies. To that end, such local communication facility can comprise, for instance, the module 5 with a transmitting/receiving coil 7, mentioned earlier.

[0020] This local communication facility has a small range of a couple of meters under poor communication conditions, as in the case of packaging material of metal.

[0021] The purpose of this local communication possibility is to enable the required GSM communication to be handled by the Boxy in the most favorable position to communicate with the nearest GSM network transmitter/receiver and to communicate transmitter ID codes to neighboring Boxies unable to receive or reach the GSM transmitter/receiver in question.

[0022] Obviously, the taking over of the communication function by another Boxy is likewise subject to the condition requiring that the same transmitter identification code has been received during a minimum period of time of, for instance, at least 30 minutes.

[0023] As noted, the local communication possibility can also be used to load the information into the Boxy prior to departure.

[0024] When for such local communication a relatively low carrier frequency is chosen, so as to limit the influence of metal as a packaging material on the local communication channel, the charging of the battery of the Boxy can, if desired, also be done in a contactless manner through this interface.

[0025] Alternatively, for local communication, also media can be used that do not cause disturbances in the surroundings and which are unconditionally admitted for international use, such as, e.g., infrared communication or communication through (ultra)sound or electromagnetic communication with very low frequencies.

[0026] Optionally, as extra facility, a movement sensor or other sensors may be provided to prevent a Boxy from starting to transmit during a flight. Also, a signal can be generated, for instance via a local network, e.g. a board communication system, to suppress communications from Boxies for a defined period of time.

Claims

1. A method for tracking and tracing goods being transported, characterized in that at least one communication set is packed or linked together with the goods, which communication set comprises memory means in which, prior to transport, information about the planned transportation route along with at least one associated timeframe is stored, and which communication set is further arranged for wirelessly receiving information from a public or other communication network and for determining, on the basis of that information, whether a predetermined deviation from the planned transportation

route and/or the associated timeframe is exceeded, and, if such deviation is exceeded, for transmitting via said public or other communication network a corresponding message to a central apparatus where the transport of the goods is planned and monitored.

2. A method according to claim 1, characterized in that the communication network is a network for mobile telephony.

3. A method according to claim 2, characterized in that, as communication network, the GSM network is used.

4. A method according to any one of the preceding claims, characterized in that the central apparatus comprises a central planning computer.

5. A method for tracking and tracing goods according to any one of claims 1 to 4, characterized in that the actual position of the goods is determined by the communication set on the basis of transmitter identification codes of the communication network, or on the basis of a so-called fingerprint of these transmitter identification codes, without the content meaning of these codes needing to be known.

6. A method for tracking and tracing goods according to any one of the preceding claims, characterized in that the communication set further comprises means for enabling local short-distance communication for exchanging data with similar communication sets located in the direct surroundings.

7. A method for tracking and tracing goods according to any one of the preceding claims, utilizing two or more communication sets located a short distance from each other, characterized in that a communication, if any, via the public or other network with the central apparatus is carried out via the communication set which is located in the most favorable position in comparison with the other communication sets in the direct surroundings with which the communication set in question can communicate via the local communication possibility.

8. A method for tracking and tracing goods according to one or more of the preceding claims, characterized in that a communication, if any, via the public or other network with the central apparatus takes place if the transmitter identification code that is received by the communication set, or a fingerprint thereof, is on a pre-inputted planning list of the communication set and so is known, and if this code has been received during a preset period of time, so as to prevent communication during a flight.

9. A method for tracking and tracing goods according to one or more of the preceding claims, characterized in that the central planning computer, after a report from a communication set (Boxy) on a deviation from the planned transportation route and/or the associated timeframe, searches for an alternative transport possibility for the goods in question, and passes the corresponding new planning information via said communication network to the communication set in question.

10. A method for tracking and tracing goods according to one or more of the preceding claims, characterized in that all transmitter identification codes received by the communication sets during the transport, or fingerprints of these codes, are stored in the communication set and, following transport, are passed to the central apparatus, which renders the system self-learning for the benefit of similar transports to take place in the future.

11. A method for tracking and tracing goods according to one or more of the preceding claims, characterized in that for the local communication between the communication sets (Boxies), a different, non-radiofrequency medium is used, such as, for instance, infrared communication or acoustic communication.

12. A system for practicing a method according to any one of the preceding claims, characterized by a central planning computer and a number of mobile communication sets, the planning computer and the mobile communication sets being arranged for wireless communication with each other via a communication network, the mobile communication sets comprising a memory for storing transportation route information in the form of identification codes or fingerprints of transmitters of the communication network that are located along the transportation route, and associated timeframes, as well as receiving means for receiving the identification codes or fingerprints, and comparator means for comparing the received identification codes or fingerprints and the associated timeframes with each other, and transmitting means for transmitting a message to the central planning computer via the communication network when a predetermined deviation is exceeded.

13. A system according to claim 12, characterized in that at least a number of communication sets are provided with means for short-distance communication with similar communication sets.

14. A communication set arranged for use in a method according to any one of claims 1 to 11 and/or a system according to claim 12 or 13.

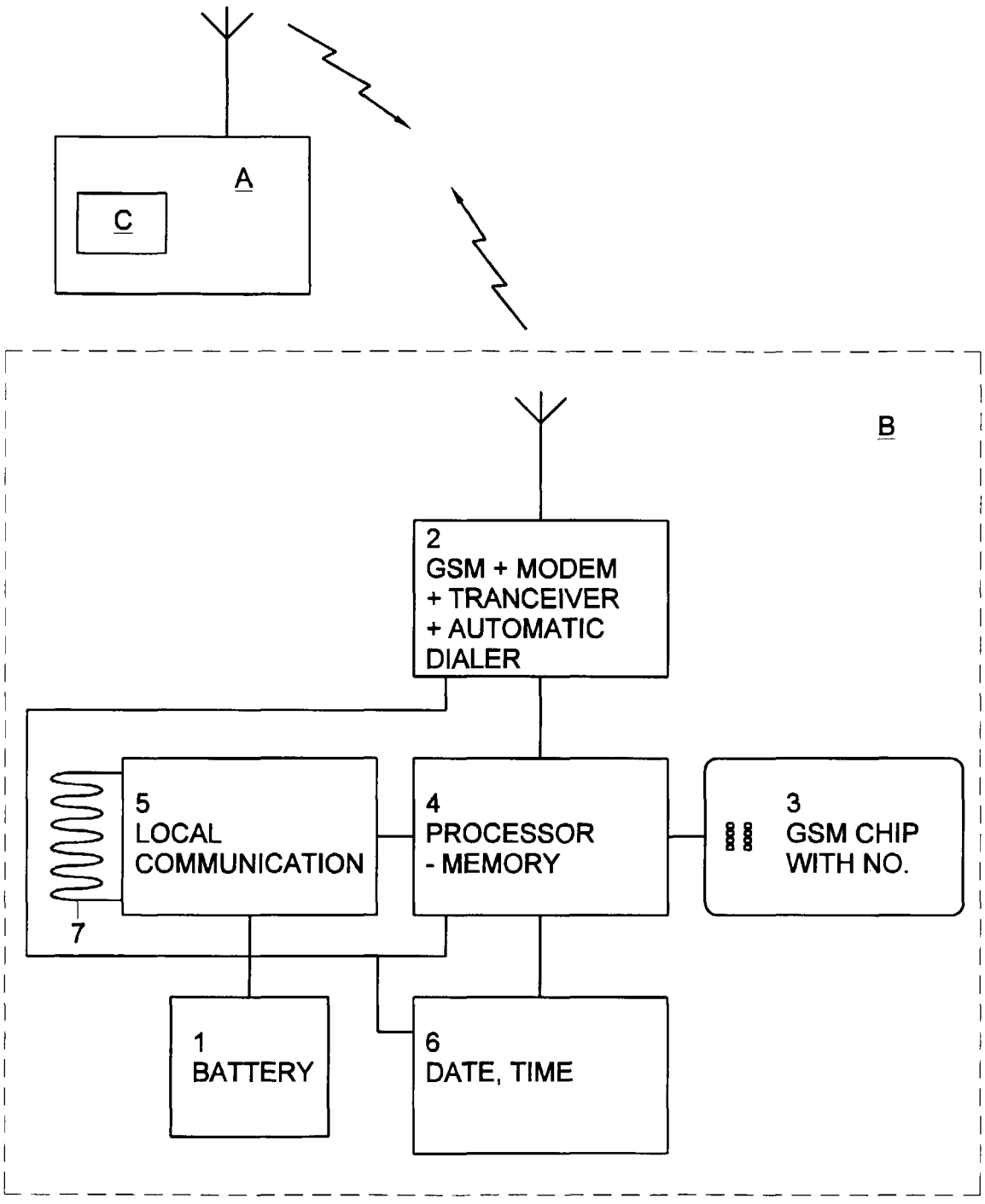
A
C
B
2
GSM + MODEM
+ TRANCEIVER
+ AUTOMATIC
DIALER
5
LOCAL
COMMUNICATION
4
PROCESSOR
- MEMORY
3
GSM CHIP
WITH NO.
7
1
BATTERY
6
DATE, TIME

Fig. 1