A NAVIGATION DEVICE AND METHOD FOR ENHANCING TRAFFIC DATA

(57) Abstract: A method and device are disclosed for navigation. In at least one embodiment, the method includes connecting a navigation device, located in a vehicle, to a server; transmitting information relating to changes in position and speed of the vehicle to the server; and receiving information, relating to potential delays along a route of travel of the vehicle, from the server, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles. In at least one embodiment, the navigation device includes a modem to connect a navigation device, located in a vehicle, to a server; a transmitter to transmit information relating to changes in position and speed of the vehicle to the server; and a receiver to receive information, relating to potential delays along a route of travel of the vehicle, from the server, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles.
A NAVIGATION DEVICE AND METHOD FOR ENHANCING TRAFFIC DATA

Field

The present application generally relates to navigation methods and devices.

Background

Navigation devices were traditionally utilized to provide services in vehicles or even on foot, for navigating between two points. Such devices, when used in vehicles, often initially tried to plan a fastest route based upon, for example, a route including mostly highway usage. Such a route was planned to maximize vehicle speed during travel along the route. During such travel, however, a vehicle would often encounter traffic delays, which would slow travel along even a route including mostly highways. Accordingly, navigation devices became more sophisticated and were able to receive information and to utilize the information to plan navigation routes around the traffic delays. Such information was calculated and received, for example, via a mobile phones as will be explained as follows.

In known systems for providing such traffic information, the data upon which the traffic information was calculated was often gathered from the tracking mobile devices themselves. Although movement of mobile phones could be monitored, it was often difficult to determine if a moving mobile phone was present on a walking/running pedestrian, on another moving vehicle not present on the roadways such as a train for example, etc. As such, the traffic information calculated from this information and later supplied to the navigation device was often not accurate.

SUMMARY

The inventors discovered that if more accurate data regarding vehicle speed, vehicle slow downs and other data for calculating traffic conditions is supplied, then more accurate information can be provided to the navigation device regarding current traffic conditions. As such, the inventors developed a system and method to obtain data from navigation devices themselves, to more accurately calculate traffic condition.
In at least one embodiment of the present application, a method includes connecting a navigation device, located in a vehicle, to a server; transmitting information relating to changes in position and speed of the vehicle to the server; and receiving information, relating to potential delays along a route of travel of the vehicle, from the server, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles.

In at least one embodiment of the present application, a navigation device includes a modem to connect a navigation device, located in a vehicle, to a server; a transmitter to transmit information relating to changes in position and speed of the vehicle to the server; and a receiver to receive information, relating to potential delays along a route of travel of the vehicle, from the server, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles.

In at least one embodiment of the present application, a navigation device includes means for connecting a navigation device, located in a vehicle, to a server; means for transmitting information relating to changes in position and speed of the vehicle to the server; and means for receiving information, relating to potential delays along a route of travel of the vehicle, from the server, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The present application will be described in more detail below by using example embodiments, which will be explained with the aid of the drawings, in which: Figure 1 illustrates an example view of a Global Positioning System (GPS); Figure 2 illustrates an example block diagram of electronic components of a navigation device of an embodiment of the present application; Figure 3 illustrates an example block diagram of a server, navigation device and connection therebetween of an embodiment of the present application;
Figures 4A and 4B are perspective views of an actual implementation of an embodiment of the navigation device 200;
Figure 5 is an example embodiment illustrating the modem and SIM card of the navigation device;
Figure 6 is a screenshot showing a displayed traffic delay; and
Figure 7 is a screenshot showing icons for selection.

**DETAILED DESCRIPTION OF THE EXAMPLE EMBODIMENTS**

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present invention. As used herein, the singular forms "a", "an", and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "includes" and/or "including", when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

In describing example embodiments illustrated in the drawings, specific terminology is employed for the sake of clarity. However, the disclosure of this patent specification is not intended to be limited to the specific terminology so selected and it is to be understood that each specific element includes all technical equivalents that operate in a similar manner.

Referencing the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, example embodiments of the present patent application are hereafter described. Like numbers refer to like elements throughout. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

Figure 1 illustrates an example view of Global Positioning System (GPS), usable by navigation devices, including the navigation device of embodiments of the present application. Such systems are known and are used for a variety of purposes. In general, GPS is a satellite-radio based navigation system capable of determining continuous position, velocity, time, and in some instances direction information for an unlimited number of users.
Formerly known as NAVSTAR, the GPS incorporates a plurality of satellites which work with the earth in extremely precise orbits. Based on these precise orbits, GPS satellites can relay their location to any number of receiving units. The GPS system is implemented when a device, specially equipped to receive GPS data, begins scanning radio frequencies for GPS satellite signals. Upon receiving a radio signal from a GPS satellite, the device determines the precise location of that satellite via one of a plurality of different conventional methods. The device will continue scanning, in most instances, for signals until it has acquired at least three different satellite signals (noting that position is not normally, but can be determined, with only two signals using other triangulation techniques). Implementing geometric triangulation, the receiver utilizes the three known positions to determine its own two-dimensional position relative to the satellites. This can be done in a known manner. Additionally, acquiring a fourth satellite signal will allow the receiving device to calculate its three dimensional position by the same geometrical calculation in a known manner. The position and velocity data can be updated in real time on a continuous basis by an unlimited number of users.

As shown in Figure 1, the GPS system is denoted generally by reference numeral 100. A plurality of satellites 120 are in orbit about the earth 124. The orbit of each satellite 120 is not necessarily synchronous with the orbits of other satellites 120 and, in fact, is likely asynchronous. A GPS receiver 140, usable in embodiments of navigation devices of the present application, is shown receiving spread spectrum GPS satellite signals 160 from the various satellites 120. The spread spectrum signals 160, continuously transmitted from each satellite 120, utilize a highly accurate frequency standard accomplished with an extremely accurate atomic clock. Each satellite 120, as part of its data signal transmission 160, transmits a data stream indicative of that particular satellite 120. It is appreciated by those skilled in the relevant art that the GPS receiver device 140 generally acquires spread spectrum GPS satellite signals 160 from at least three satellites 120 for the GPS receiver device 140 to calculate its two-dimensional position by triangulation. Acquisition of an additional signal, resulting in signals 160 from a total of four satellites 120, permits the GPS
receiver device 140 to calculate its three-dimensional position in a known manner.

Figure 2 illustrates an example block diagram of electronic components of a navigation device 200 of an embodiment of the present application, in block component format. It should be noted that the block diagram of the navigation device 200 is not inclusive of all components of the navigation device, but is only representative of many example components.

The navigation device 200 is located within a housing (not shown). The housing includes a processor 210 connected to an input device 220 and a display screen 240. The input device 220 can include a keyboard device, voice input device, touch panel and/or any other known input device utilized to input information; and the display device 240 can include any type of display screen such as an LCD display, for example. In at least one embodiment of the present application, the input device 220 and display device 240 are integrated into an integrated input and display device, including a touchpad or touchscreen input wherein a user need only touch a portion of the display device 240 to select one of a plurality of display choices or to activate one of a plurality of virtual buttons.

In addition, other types of output devices 260 can also include, including but not limited to, an audible output device. As output device 260 can produce audible information to a user of the navigation device 200, it is equally understood that input device 240 can also include a microphone and software for receiving input voice commands as well.

In the navigation device 200, processor 210 is operatively connected to and set to receive input information from input device 240 via a connection, and operatively connected to at least one of display device 240 and output device 260, via connections to output information thereto. Further, the processor 210 is operatively connected to memory 230 via a connection and is further adapted to receive/send information from/to input/output (I/O) ports 270 via a connection, wherein the I/O port 270 is connectible to an I/O device 280 external to the navigation device 200. The external I/O device 270 may include, but is not limited to an external listening device such as an earpiece for example. The connection to I/O device 280 can further be a wired or wireless.
connection to any other external device such as a car stereo unit for hands-free operation and/or for voice activated operation for example, for connection to an ear piece or head phones, and/or for connection to a mobile phone for example, wherein the mobile phone connection may be used to establish a data connection between the navigation device 200 and the internet or any other network for example, and/or to establish a connection to a server via the internet or some other network for example.

In at least one embodiment, the navigation device 200 includes an internal modem 290, connected to processor 210 and memory 230, for establishing data connections as will be described hereafter. The modem 290 may further be connected to transceiver 300 for transmitting information to and receiving information from server 302. The transceiver 300 is further connected to processor 210.

The navigation device 200, in at least one embodiment, may establish a “mobile” network connection with the server 302 via an external mobile device not shown (such as a mobile phone, PDA, and/or any device with mobile phone technology) establishing a digital connection (such as a digital connection via known Bluetooth technology for example). Thereafter, through its network service provider, the mobile device can establish a network connection (through the internet for example) with a server 302. As such, a “mobile” network connection may be established between the navigation device 200 (which can be, and often times is mobile as it travels alone and/or in a vehicle) and the server 302 to provide a “real-time” or at least very “up to date” gateway for information.

The establishing of the network connection between the mobile device (via a service provider) and another device such as the server 302, using the internet for example, can be done in a known manner. This can include use of TCP/IP layered protocol for example. The mobile device can utilize any number of communication standards such as CDMA, GSM, WAN, Wimax, Wifi etc. As such, an internet connection may be utilized which is achieved via data connection, via a mobile phone or mobile phone technology within the navigation device 200 for example. For this connection, an internet connection between the server 302 and the navigation device 200 is established. This can
be done, for example, through a mobile phone or other mobile device and a GPRS (General Packet Radio Service)-connection (GPRS connection is a high-speed data connection for mobile devices provided by telecom operators; GPRS is a method to connect to the internet.

The navigation device 200 can further complete a data connection with the mobile device, and eventually with the internet and server 302, via existing Bluetooth technology for example, in a known manner, wherein the data protocol can utilize any number of standards, such as the GSRM, the Data Protocol Standard for the GSM standard, for example.

For GPRS phone settings, the Bluetooth enabled device may be used to correctly work with the ever changing spectrum of mobile phone models, manufacturers, etc., model/manufacturer specific settings may be stored on the navigation device 200 for example. The data stored for this information can be updated in a manner discussed in any of the embodiments, previous and subsequent.

The navigation device 200 may include its own mobile phone technology within the navigation device 200 itself (including an antenna for example, wherein the internal antenna of the navigation device 200 can further alternatively be used). The mobile phone technology within the navigation device 200 can include internal components as specified above, and/or can include an insertable SIM (subscriber identity module) card, complete with necessary mobile phone technology and/or an antenna for example. As such, mobile phone technology within the navigation device 200, in conjunction with modem 290, can similarly establish a network connection between the navigation device 200 and the server 302, via the internet for example, in a manner similar to that of any mobile device. It should be noted that such a modem 290 can be internal to the navigation device 200, or external thereto, such as in an adapter for example, see U.S. application serial number 11/907,254 entitled “Enhanced Cigarette Lighter Adapter” and filed October 10, 2007, the entire contents of which are hereby incorporated herein by reference. If located in the adapter, upon the adapter being plugged in to a vehicle for example, power can be supplied to the navigation device 200. In addition, the modem can then be triggered to
establish a network connection with the server 200 to send information thereto and receive information therefrom.

Figure 2 further illustrates an operative connection between the processor 210 and an antenna/receiver 250, wherein the antenna/receiver 250 can be a GPS antenna/receiver for example. It will be understood that the antenna and receiver designated by reference numeral 250 are combined schematically for illustration, but that the antenna and receiver may be separately located components, and that the antenna may be a GPS patch antenna or helical antenna for example.

Further, it will be understood by one of ordinary skill in the art that the electronic components shown in Figure 2 are powered by power sources (not shown) in a conventional manner. As will be understood by one of ordinary skill in the art, different configurations of the components shown in Figure 2 are considered within the scope of the present application. For example, in one embodiment, the components shown in Figure 2 may be in communication with one another via wired and/or wireless connections and the like. Thus, the scope of the navigation device 200 of the present application includes a portable or handheld navigation device 200.

Figure 3 illustrates an example block diagram of a server 302 and a navigation device 200 of the present application, via a generic communications channel 318, of an embodiment of the present application. The server 302 and a navigation device 200 of the present application can communicate when a connection via communications channel 318 is established between the server 302 and the navigation device 200 (noting that such a connection can be a data connection via mobile device, a direct connection via personal computer via the internet, a data connection via modem 290, etc.).

The server 302 includes, in addition to other components which may not be illustrated, a processor 304 operatively connected to a memory 306 and further operatively connected, via a wired or wireless connection 314, to a mass data storage device 312. The processor 304 is further operatively connected to transmitter 308 and receiver 310, to transmit and send information to and from navigation device 200 via communications channel 318. The signals sent and received may include data, communication, and/or other propagated signals.
Information received by server 302 can include but is not limited to received information relating to changes in position and speed of a vehicle housing a navigation device 200; and information sent by the server 302 can include but is not limited to calculated traffic information and/or other information relating to potential delays along a route of travel of a vehicle in which a navigation device 200 is located. The transmitter 308 and receiver 310 may be selected or designed according to the communications requirement and communication technology used in the communication design for the navigation system 200. Further, it should be noted that the functions of transmitter 308 and receiver 310 may be combined into a signal transceiver 309.

Server 302 is further connected to (or includes) a mass storage device 312, noting that the mass storage device 312 may be coupled to the server 302 via communication link 314. The mass storage device 312 contains a store of navigation data and map information, and can again be a separate device from the server 302 or can be incorporated into the server 302.

The navigation device 200 is adapted to communicate with the server 302 through any communications channel generally designated by 318, and includes processor, memory, etc. as previously described with regard to Figure 2, as well as transmitter 320 and receiver 322 to send and receive signals and/or data through the communications channel 318, noting that these devices can further be used to communicate with devices other than server 302. Further, the transmitter 320 and receiver 322 are selected or designed according to communication requirements and communication technology used in the communication design for the navigation device 200 and the functions of the transmitter 320 and receiver 322 may be combined into a single transceiver 300.

Software stored in server memory 306 provides instructions for the processor 304 and allows the server 302 to provide services to the navigation device 200, such as calculation and transmission of traffic information and/or other information relating to potential delays along a route of travel of a vehicle in which a navigation device 200 is located. One service provided by the server 302 involves processing requests from the navigation device 200 and transmitting navigation data from the mass data storage 312 to the navigation
device 200. According to at least one embodiment of the present application, another service provided by the server 302 includes processing the navigation data using various algorithms for a desired application (such as calculation of traffic information and/or other information relating to potential delays along a route of travel of a vehicle in which a navigation device 200 is located for example) and sending the results of these calculations to the navigation device 200.

The communication channel 318 generically represents the propagating medium or path that connects the navigation device 200 and the server 302. According to at least one embodiment of the present application, both the server 302 and navigation device 200 include a transmitter for transmitting data through the communication channel and a receiver for receiving data that has been transmitted through the communication channel.

The communication channel 318 is not limited to a particular communication technology. Additionally, the communication channel 318 is not limited to a single communication technology; that is, the channel 318 may include several communication links that use a variety of technology. For example, according to at least one embodiment, the communication channel 318 can be adapted to provide a path for electrical, optical, and/or electromagnetic communications, etc. As such, the communication channel 318 includes, but is not limited to, one or a combination of the following: electric circuits, electrical conductors such as wires and coaxial cables, fiber optic cables, converters, radio-frequency (rf) waves, the atmosphere, empty space, etc. Furthermore, according to at least one various embodiment, the communication channel 318 can include intermediate devices such as routers, repeaters, buffers, transmitters, and receivers, for example.

In at least one embodiment of the present application, for example, the communication channel 318 includes telephone and computer networks. Furthermore, in at least one embodiment, the communication channel 318 may be capable of accommodating wireless communication such as radio frequency, microwave frequency, infrared communication, etc. Additionally, according to at least one embodiment, the communication channel 318 can accommodate satellite communication. Additionally, according to at least one embodiment,
the communication channel 318 can accommodate multiple, independent satellite systems, and GPS receivers capable of multiple frequencies and signal acquisitions. (Covers impending addition of Multiple Satellite Systems, including, but no limited to; GLONASS, GPS 2, GPS 2.5 – 3, Galileo and ChinaSat).

The communication signals transmitted through the communication channel 318 include, but are not limited to, signals as may be required or desired for given communication technology. For example, the signals may be adapted to be used in cellular communication technology such as Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA), Code Division Multiple Access (CDMA), Global System for Mobile Communications (GSM), etc. Both digital and analogue signals can be transmitted through the communication channel 318. According to at least one embodiment, these signals may be modulated, encrypted and/or compressed signals as may be desirable for the communication technology.

The mass data storage 312 includes sufficient memory for the desired navigation applications. Examples of the mass data storage 312 may include magnetic data storage media such as hard drives for example, optical storage media such as CD-Roms for example, charged data storage media such as flash memory for example, molecular memory, etc.

According to at least one embodiment of the present application, the server 302 includes a remote server accessible by the navigation device 200 via a wireless channel. According to at least one other embodiment of the application, the server 302 may include a network server located on a local area network (LAN), wide area network (WAN), virtual private network (VPN), etc.

According to at least one embodiment of the present application, the server 302 may include a personal computer such as a desktop or laptop computer, and the communication channel 318 may be a cable connected between the personal computer and the navigation device 200. Alternatively, a personal computer may be connected between the navigation device 200 and the server 302 to establish an internet connection between the server 302 and the navigation device 200. Alternatively, a mobile telephone or other handheld device (and/or a modem such as modem 290) may establish a wireless
connection to the internet, for connecting the navigation device 200 to the server 302 via the internet.

The navigation device 200 may be provided with information from the server 302 via information downloads which may be periodically updated upon a user connecting navigation device 200 to the server 302 and/or may be more dynamic upon a more constant or frequent connection being made between the server 302 and navigation device 200 via a wireless mobile connection device and TCP/IP connection for example. For many dynamic calculations, the processor 304 in the server 302 may be used to handle the bulk of the processing needs, however, processor 210 of navigation device 200 can also handle much processing and calculation, oftentimes independent of a connection to a server 302.

The mass storage device 312 connected to the server 302 can include volumes more cartographic and route data than that which is able to be maintained on the navigation device 200 itself, including maps, etc. The server 302 may process, for example, the majority of the devices of a navigation device 200 which travel along the route using a set of processing algorithms. Further, the cartographic and route data stored in memory 312 can operate on signals (e.g. GPS signals), originally received by the navigation device 200.

As indicated above in Figure 2 of the application, a navigation device 200 of an embodiment of the present application includes a processor 210, an input device 220, and a display screen 240. In at least one embodiment, the input device 220 and display screen 240 are integrated into an integrated input and display device to enable both input of information (via direct input, menu selection, etc.) and display of information through a touch panel screen, for example. Such a screen may be a touch input LCD screen, for example, as is well known to those of ordinary skill in the art. Further, the navigation device 200 can also include any additional input device 220 and/or any additional output device 240, such as audio input/output devices for example.

Figures 4A and 4B are perspective views of an actual implementation of an embodiment of the navigation device 200. As shown in Fig. 4A, the navigation device 200 may be a unit that includes an integrated input and display device 290 (a touch panel screen for example) and the other components of figure 2.
(including but not limited to internal GPS receiver 250, microprocessor 210, a power supply, memory systems 220, etc.).
The navigation device 200 may sit on an arm 292, which itself may be secured to a vehicle dashboard/window/etc. using a large suction cup 294. This arm 292 is one non-limiting example of a docking station to which the navigation device 200 can be docked.
As shown in Fig. 4B, the navigation device 200 can be docked or otherwise connected to an arm 292 of the docking station by snap connecting the navigation device 292 to the arm 292 for example (this is only one example, as other known alternatives for connection to a docking station are within the scope of the present application). The navigation device 200 may then be rotatable on the arm 292, as shown by the arrow of Fig. 4B. To release the connection between the navigation device 200 and the docking station, a button on the navigation device 200 may be pressed, for example (this is only one example, as other known alternatives for disconnection to a docking station are within the scope of the present application).
The navigation device 200, in at least one embodiment, may establish a “mobile” network connection with the server 302 via a mobile device 400 (such as a mobile phone, PDA, and/or any device with mobile phone technology) establishing a digital connection (such as a digital connection via known Bluetooth technology for example). Thereafter, through its network service provider, the mobile device 400 can establish a network connection (through the internet for example) with a server 302. As such, a “mobile” network connection is established between the navigation device 200 (which can be, and often times is mobile as it travels alone and/or in a vehicle) and the server 302 to provide a “real-time” or at least very “up to date” gateway for information.
The establishing of the network connection between the mobile device 400 (via a service provider) and another device such as the server 302, using the internet 410 for example, can be done in a known manner. This can include use of TCP/IP layered protocol for example. The mobile device 400 can utilize any number of communication standards such as CDMA, GSM, WAN, etc.
As such, an internet connection may be utilized which is achieved via data connection, via a mobile phone or mobile phone technology within the
navigation device 200 for example. For this connection, an internet connection 
between the server 302 and the navigation device 200 is established. This can 
be done, for example, through a mobile phone or other mobile device and a 
GPRS (General Packet Radio Service)-connection (GPRS connection is a high-
speed data connection for mobile devices provided by telecom operators; GPRS 
is a method to connect to the internet).
The navigation device 200 can further complete a data connection with the 
mobile device 400, and eventually with the internet 410 and server 302, via 
existing Bluetooth technology for example, in a known manner, wherein the 
data protocol can utilize any number of standards, such as the GSRM, the Data 
Protocol Standard for the GSM standard, for example.
The navigation device 200 may include its own mobile phone technology within 
the navigation device 200 itself (including an antenna for example, wherein the 
internal antenna of the navigation device 200 can further alternatively be used). 
The mobile phone technology within the navigation device 200 can include 
internal components as specified above, and/or can include an insertable card, 
complete with necessary mobile phone technology and/or an antenna for 
example. As such, mobile phone technology within the navigation device 200 
can similarly establish a network connection between the navigation device 200 
and the server 302, via the internet 410 for example, in a manner similar to 
that of any mobile device 400.
For GRPS phone settings, the Bluetooth enabled device may be used to 
correctly work with the ever changing spectrum of mobile phone models, 
manufacturers, etc., model/manufacturer specific settings may be stored on the 
navigation device 200 for example. The data stored for this information can be 
updated in a manner discussed in any of the embodiments, previous and 
subsequent.
In an embodiment of the present application, a method includes connecting a 
navigation device 200, located in a vehicle, to a server 302; transmitting 
information relating to changes in position and speed of the vehicle to the 
server 302; and receiving information, relating to potential delays along a route 
of travel of the vehicle, from the server 302, the received information being 
determined based at least partially upon information relating to changes in
position and speed transmitted from navigation devices of a plurality of vehicles.

In an embodiment of the present application, a navigation device 200 includes a modem 290 to connect a navigation device 200, located in a vehicle, to a server 302; a transmitter 320 to transmit information relating to changes in position and speed of the vehicle to the server 302; and a receiver 322 to receive information, relating to potential delays along a route of travel of the vehicle, from the server 302, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles.

Thus, in an embodiment of the present application, mobile phone technology located within the navigation device 200 itself can include a modem 290, either located internal to the navigation device 200 or external thereto, such as in an adapter for example. Further, a SIM card (enabled for GPRS data traffic for example) can be included in the navigation device 200 to allow the modem 290 to connect to the server 302. The Murcia Network Interface Protocol covers the steps and stages of Start-up Protocol, network selection, network connection, IP Address selection, VPN establishment, data-transfer, and network disconnection. It also covers the rules associated with, and in order to determine modem to network actions.

As such, a connection between the navigation device 200 and the server 302 can be established upon powering on of the navigation device 200.

In an embodiment of the present application, once the navigation device 200 is purchased and turned on, a data (e.g. internet) connection between the modem 290 and server 302 is established to permit receipt of information relating to potential delays along a route of travel of a vehicle housing the navigation device 200 (such as traffic information for example) from the server 302.

However, as the data connection is established with the server 302 in such an automatic manner, the server 302 can thus receive information relating to changes in speed and position determined in the navigation device 200 (for example, the processor 210 of the navigation device 200 can detect position from received GPS signals and can calculate vehicle speeds from GPS positions, map location information, and time traveled between positions, and can store
such information periodically in memory 230 for example) from a plurality of
navigation devices 200. Thus, information may be transmitted from the
transmitter 320 or received by the receiver 322 of the navigation device 200 in
an initial start-up sequence with a device type code, as part of the connection
established by the modem 290 between the navigation device 200 and the
server 302.
Thus, the server 302 can thus perform calculations regarding potential delays
along travel routes using more accurate data, although the calculations
themselves are generally performed in a known manner. The traffic delay
information received by the navigation device 200 will be more accurate, as it is
being determined based at least partially upon information relating to changes
in position and speed and transmitted from a plurality of navigation devices of a
plurality of vehicles (the vehicles housing the navigation devices 200). As such,
an efficient system for collecting better and more accurate data, from which
traffic or other information relating to potential delays along a route of travel of
a vehicle housing the navigation device 200 can be calculated in a known
manner in server 302.
Connection is an automated process, beginning at start-up of the navigation
device 200, and controlled through a piece of low level code that selects the
strongest network signal after referencing a control list. This is called the white
list, and is a list of “allowed” networks stored in the modem 290, and part of the
Network Interface Protocol. As such, a network addresses for network
connection is established. The second part of the process is using the data
from a plurality of navigation devices to obtain better traffic information using
algorithmic traffic calculations. This process is an off-board process, not
calculated on the navigation device 200, but rather fed to the device OTA from
server 302. The addition of the new data elements directly from the “known”
navigation devices becomes an addition to the algorithm to the server 302 in
adding certain signal sets, and eliminating false vehicle markers.
Compatible GPRS modems to most commercial available GPRS, CDMA, TDMA,
or analogue modems may be used as modem 290, with the following example
characteristics, to include the capability of two way data transfer, with
simultaneous data Input Output, On-Board RAM, and digital signal acquisition:
TriBand or QuadBand modems to follow below geographic Frequency guide:

850 MHz (In America)
900 MHz (In Europe and many parts of Asia)
1800 MHz (In Europe and Asia)
1900 MHz (In America)

The calculation of traffic or other information relating to potential delays along the route of travel of a vehicle housing the navigation device 200 is only as good as the data collected. As previously stated, known systems exist such as that of USP 6,650,948 to Atkinson et al. issued November 18, 2003 for example, the entire contents of which are incorporated herein by reference, which monitor information (and provide information relating to potential delays to navigation devices along routes of travel of vehicles housing the navigation devices) relating to changes in speed and position of mobile phones for example which, at times, may be located in places other than cars such as on planes, trains, and other vehicles not related to traffic congestion (see also US Provisional application _____, entitled "System For Generating Traffic Information" and filed on October 26, 2007, the entire contents of which are incorporated herein by reference).

In an embodiment of the present application, however, the data collected by the server 302, from which the traffic or other information relating to potential delays along the route of travel is determined, is collected from navigation devices (in place of or in addition to the mobile phone information) such as navigation device 200 for example, located within a vehicle housing the navigation device 200, wherein such a vehicle is directly related to such traffic or potential delay conditions. By using a modem 290 within the navigation device 200, or external thereto in an adaptor of the navigation device 200 for example, information relating to changes in position and speed of the vehicle in which the navigation device 200 is located, can be transmitted to the server 302. The server 302 can then receive information relating to changes in position and speed transmitted from a plurality of vehicles, and can thus utilize better information (alone or in combination with other information collected from mobile phones as discussed above) from which to build more accurate
traffic models to aid in determining potential delays along a route of travel of the vehicles housing the navigation device 200. An example of a known system for obtaining information and building traffic modules by determining vehicle slow downs and stoppages in conjunction with map location information is that of USP 6,650,948 to Atkinson et al. issued November 18, 2003 for example, the entire contents of which are incorporated herein by reference.

Mathematically, adding "known" elements (data from "known" navigation devices) to a pattern equation increases reliability of data accuracy. By eliminating an unknown device type and replacing it with a known device type, an uncertain is removed and is replaced with a certain. This has a double effect on a signal calculation, reducing variance by eliminating different use types (speed and location information of mobiles on trains, pedestrians, bicycles and therefore unrelated to vehicle traffic as was previously obtained from mobile device information) and increasing a core set of "known" devices (known to directly affect vehicle traffic congestion), with a category of use to reference; a test set.

The information transmitted from the transmitter 320 of the navigation device 200 may be useable by the server 302 to identify the navigation device 200, to identify intended vehicle usage and vehicle type based upon the identified navigation device 200, and/or to increase at least one of mathematical accuracy and reliability in the information received by the navigation device 200, relating to potential delays along the route of travel of the vehicle. For example, the information transmitted from the transmitter 320 may be useable to determine a category type of the navigation device 200. The category type of the navigation device 200 may include at least one for commercial usage, consumer usage, motorcycle usage, and/or pedestrian usage.

The information transmitted from the transmitter 320 may further be useable by the server 302 to determine traffic patterns and potential delays along the route of travel of the vehicle and/or to improve defining of traffic behavior, to further determine traffic patterns and potential delays along the route of travel of the vehicle, and/or to aid the navigation device in providing a revised route of travel based upon the received information. Further, the information transmitted from the transmitter 320 may further be useable to determine
traffic behavior and expected flow patterns with enhanced accuracy and predictive methods, due to increased signal node identification for example.

In an embodiment, the navigation device 200 may attempt to establish a GPRS connection, for example, using the modem 290 as soon as the navigation device 200 is switched on and/or connected to a power supply through an adaptor. Network connection to the server 302 can be provided via the SIM card, inserted into the navigation device 200 to establish network addresses for network connection of the modem 290 for example. Network Connection may be an automated process following data stored for this process on the modem 290 itself, which contains information that can be updated in a manner discussed in any of the embodiments, previous and subsequent.

Such a SIM card and modem 290 are shown in Figure 5, within the navigation device 200. The SIM card can be provided to the user in exchange for fees for subscribing to a traffic service for example. By default, if the modem 290 is internal to the navigation device 200, the modem 290 may always be enabled and/or if included in an adaptor of the navigation device, may be enabled upon the adaptor being connected to the vehicle.

In an embodiment of the present application, the traffic and/or information relating to potential delays along the route of travel of the vehicle may be transmitted by a server 302 and subsequently received by a navigation device 200 periodically. The periodic receipt of this information can be, for example, every three minutes.

Information may be sent/received via modem 290 and transceiver 300 wherein packets of data are sent /received to the IP address directed by IP Address is stored on the modem 290, in code, as part of a protocol. This protocol knows if the navigation device 200 is a TomTom Work device user (Commercial) or a TomTom PLUS device user (Consumer), based on a piece of code written to the SIM card. In the initial navigation device 200 Start-up, the modem 290 reads the SIM for this code, and "sets" the navigation device type. From this, the navigation device 200 becomes a Commercial or Consumer navigation device, and thus uses a specific IP address of either. As a whole, this is part of the Network Interface Protocol.
The information transmitted from the transmitter 320 of the navigation device 200 may be useable by the server 302 to identify the navigation device 200, to identify intended vehicle usage and vehicle type based upon the identified navigation device 200, and/or to increase at least one of mathematical accuracy and reliability in the information received by the navigation device 200, relating to potential delays along the route of travel of the vehicle. For example, the information transmitted from the transmitter 320 may be useable to determine a category type of the navigation device 200. The category type of the navigation device 200 may include at least one for commercial usage, consumer usage, motorcycle usage, and/or pedestrian usage. Once the Network Interface Protocol connection between the navigation device 200 and the server 302 is established, as part of the Protocol, the connection may be identified with a device type.

The modem 290 may be, for example, dual integrated for both GPS and GPRS. By establishing a constant connection between the navigation device 200 and the server 302, via the modem 290 for example, information can be transmitted from the navigation device 200, such as information relating to changes in position and speed of a vehicle, to the server 302 at a time the same as or different from receipt of the traffic or other information relating to potential delays. Thus, data can be collected by the server 302 at any time during the aforementioned periodic interval; and can further be collected multiple times during the aforementioned interval.

Further, once the connection between the navigation device 200 and the server 302 is established (via initiation by the server 302 for example), information may either be transmitted from or received by the navigation device 200 (this can be done during times other than times of periodic receipt by the navigation device 200 for example), wherein the connection may be established between a modem 290 within a navigation device 200 and the server 302, and/or within an adaptor of the navigation device 200 for example.

When the navigation device 200 is powered, such as via an adapter or when the device is turned on for example, this initiates an automated Initiation protocol that the modem 290, with the corresponding SIM card, start an Network Interface Protocol. Searching for available networks stored on a White List –
Listings of allowed networks – the modem 290 will find and select the appropriate network. Further, the SIM card (enabled for GPRS data traffic for example) will transfer account and settings information to the network, establishing an IP Address, stored in the modem 290, and start a Virtual Private Network connection with server 302. The Modem 290, SIM card and Network Interface Protocol (Network authoring code) can be included in the navigation device 200 to allow the modem 290 to connect to the server 302. The navigation device 200 will request information stored on the server 302. A Communication line (a “connection” between the navigation device 200 and the server 302) is established, (via initiation by the server 302 for example), and data is thereafter transferred.

During the aforementioned interval, at times other than the specific times when traffic information or other information relating to potential delays is sent to and subsequently received by the navigation device 200, requests for information uploads can be sent from the server 302. Thus, information may be transmitted from the navigation device 200 based upon requests for information uploads from the server 302, during times other than times of periodic receipt.

The navigation device 200 is capable of multiple connection settings. In a common setup, two setting types are pre-installed into the navigation device 200; Commercial and Consumer. In a Commercial (TomTom Work) setting, signal accuracy, and signal availability are the primary considerations and as such modem behaviors relate to maintaining these connection parameters. In a Consumer (TomTom PLUS) setting, service availability is the primary consideration and as such the modem behavior relates to maintaining these connection parameters.

Specifically, in an embodiment of the present application, a connection is always on, initiated in a startup sequence of the navigation device 200 as explained above and Part of a Network Interface Protocol. GPRS is capable of two-way communication, and as such two-way data transfer is possible, and in some cases desirable. For example if the navigation device 200 is transferring location information to the server 302, simultaneously the server 302 could send updated traffic information to navigation device 200. In this case, two way
data transfer is necessary to maintain Traffic signal upload intervals, and traffic information download accuracy, and thus maintains updated route traffic information. Alternatively, the transfer of data can be done at different times, such as periodic or times of upload requests initiated by the server 302 for example.

Within the navigation device 200, a route of travel of the vehicle can be determined by processor 210 for example, based upon at least a desired destination (such as one input by the user of the navigation device 200 for example) and a current location of the vehicle (such as that determined by a GPS/GPRS receiver within the navigation device 200 for example). Thereafter, subsequent to receipt of information relating to potential delays along the route of travel by the vehicle, a processor 210 within the navigation device 200 can determine a revised route of travel based upon the received information. Figure 6 illustrates a display screenshot of the navigation device 200 displaying not only a route of travel of the vehicle, but also displaying a traffic bar (located on the right part of the screen of Figure 6) to inform the user of traffic incidents along a planned route. Figure 7 illustrates a subsequent display screenshot, including displays of both a particular traffic delay in the lower left corner of Figure 7, and the display of other icons, including one for minimizing traffic delays. Upon selection of such an icon, the above-mentioned determining of a revised route can occur via processor 210 for example. Thus, a display 240 of the navigation device 200 can display an indication of potential delays along the route of travel of the vehicle, subsequent to the navigation device 200 receiving the information relating to potential delays along the route of travel of the vehicle, wherein the processor 210 is useable to determine, upon receiving a request, revised route of travel based upon the received information in a known manner.

In an embodiment, the navigation device 200 can include memory 230 to store information relating to changes in position and speed of the vehicle, wherein the stored information may subsequently be transmitted from the navigation device 200 upon the modem 290 establishing a connection to the server 302. Alternatively, the information relating to changes in position and speed of the vehicle may be stored, such that the stored information may then be
transmitted from the navigation device 200 upon establishment of the
connection upon receipt of a request for information upload from the server 302
Within the navigation device 200, specifically stored on Modem 290, This is an
automated process based on a preset upload interval, this determines the
upload activity intervals, as well as connection failure protocols.
For example, based upon at least a GPS/GPRS signal available current location,
information relating to changes in position and/or speed of the vehicle can
simultaneously be transmitted from the navigation device 200 to the server 302,
based on time intervals controlled by the modem 290. In the Commercial
settings, an active transfer rate can be, for example, every 60 seconds, with 6-
10 second captures of position and/or speed of the vehicle. In an idle mode, for
example where the vehicle has not moved for certain time such as 30 minutes
for example, this interval may drop, to 5 minutes for example. Idle mode is
intended to conserve GPS/GPRS data traffic, and thus reduce terrestrial data
costs.
In either event, in such an embodiment, the information may be collected and
stored within the memory 230 of the navigation device 200, for subsequent
transmission to the server 302. For example, the modem 290 and SIM card of
the navigation device 200 may provide only limited, or no available data usage
over a network, and as such, the aforementioned transmitting of information
relating to changes in position and/or speed of the vehicle and a current
location of the vehicle (such as that determined by a GPS/GPRS receiver within
the navigation device 200 for example), will be stored at preset intervals to be
transmitted when data usage over a network is available again. If network
coverage is unavailable for a duration, the navigation device 200 can include
memory 230 to store information relating to changes in position and/or speed
of the vehicle and a current location of the vehicle until memory 230 is no
longer available. Thus, in at least one embodiment of the present application,
the navigation device can include a memory 230 to store information relating to
changes in position and speed of the vehicle, a display to display an indication
of potential delays along the route of the vehicle and to display revised route of
travel if calculated, as well as a processor to determine a route of travel of the
vehicle and to determine a revised route of travel based upon received information relating to potential delays along the route of travel of the vehicle. Data may be stored in intervals explained above, in a specific order and string structure set by the TT Work Module for example (This should be described in the TT Work Patent submissions).

In at least one embodiment, upon determining a periodic interval for sending information relating to potential delays along the route of travel of the vehicle to the navigation device 200 from the server 302, information relating to changes in position and/or speed of the vehicle can simultaneously be transmitted from the navigation device 200 to the server 302. For example, the modem 290 and SIM card of the navigation device 200 may provide only limited data usage over a network and as such, the aforementioned transmitting of information relating to changes in position and speed of the vehicle to the server 302 can be coordinated and timed with synchronized or simultaneous receipt of information related to potential delays along the route of travel of the vehicle, by the navigation device 200. As such, the navigation device 200 and server 302 can be synchronized to transmit and receive information at the same time over the established network connection. Again, during the interval between periodic sending and receiving of information, the information can be stored and collected in the navigation device 200.

The navigation device 200 of at least one embodiment expressed above may be implemented as a method including connecting a navigation device 200, located in a vehicle, to a server 302; transmitting information relating to changes in position and speed of the vehicle to the server 302; and receiving information, relating to potential delays along a route of travel of the vehicle, from the server 302, the received information being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles. The method can include, in at least one embodiment, determining a route of travel of the vehicle, based upon at least a desired destination and a current location of the vehicle; and determining, subsequent to receipt of the information relating to potential delays along the route of travel of the vehicle, a revised route of travel based upon the received information. The method can further include, in at least one
embodiment displaying an indication of potential delays along the route of travel of the vehicle, subsequent to receipt of the information relating to potential delays along the route of travel of the vehicle; and determining, upon receiving a request to calculate a revised route of travel, a revised route of travel based upon the received information. Additionally, the method can include, in at least one embodiment, storing information relating to changes in position and speed of the vehicle, wherein the stored information is transmitted from the navigation device upon establishment of the connection and upon receipt of a request for an information upload from the server.

Further, the method of at least one embodiment expressed above may be implemented as a computer data signal embodied in the carrier wave or propagated signal that represents a sequence of instructions which, when executed by a processor (such as processor 304 of server 302, and/or processor 210 of navigation device 200 for example) causes the processor to perform a respective method. In at least one other embodiment, at least one method provided above may be implemented above as a set of instructions contained on a computer readable or computer accessible medium, such as one of the memory devices previously described, for example, to perform the respective method when executed by a processor or other computer device. In varying embodiments, the medium may be a magnetic medium, electronic medium, optical medium, etc.

Even further, any of the aforementioned methods may be embodied in the form of a program. The program may be stored on a computer readable media and is adapted to perform any one of the aforementioned methods when run on a computer device (a device including a processor). Thus, the storage medium or computer readable medium, is adapted to store information and is adapted to interact with a data processing facility or computer device to perform the method of any of the above mentioned embodiments.

The storage medium may be a built-in medium installed inside a computer device main body or a removable medium arranged so that it can be separated from the computer device main body. Examples of the built-in medium include, but are not limited to, rewriteable non-volatile memories, such as ROMs and flash memories, and hard disks. Examples of the removable medium include,
but are not limited to, optical storage media such as CD-ROMs and DVDs; magneto-optical storage media, such as MOs; magnetism storage media, including but not limited to floppy disks (trademark), cassette tapes, and removable hard disks; media with a built-in rewriteable non-volatile memory, including but not limited to memory cards; and media with a built-in ROM, including but not limited to ROM cassettes; etc. Furthermore, various information regarding stored images, for example, property information, may be stored in any other form, or it may be provided in other ways.

As one of ordinary skill in the art will understand upon reading the disclosure, the electronic components of the navigation device 200 and/or the components of the server 302 can be embodied as computer hardware circuitry or as a computer readable program, or as a combination of both.

The system and method of embodiments of the present application include software operative on the processor to perform at least one of the methods according to the teachings of the present application. One of ordinary skill in the art will understand, upon reading and comprehending this disclosure, the manner in which a software program can be launched from a computer readable medium in a computer based system to execute the functions found in the software program. One of ordinary skill in the art will further understand the various programming languages which may be employed to create a software program designed to implement and perform at least one of the methods of the present application.

The programs can be structured in an object-orientation using an object-oriented language including but not limited to JAVA, Smalltalk, C++, etc., and the programs can be structured in a procedural-orientation using a procedural language including but not limited to COBOL, C, etc. The software components can communicate in any number of ways that are well known to those of ordinary skill in the art, including but not limited to by application of program interfaces (API), interprocess communication techniques, including but not limited to report procedure call (RPC), common object request broker architecture (CORBA), Component Object Model (COM), Distributed Component Object Model (DCOM), Distributed System Object Model (DSOM), and Remote Method Invocation (RMI). However, as will be appreciated by one of ordinary
skill in the art upon reading the present application disclosure, the teachings of
the present application are not limited to a particular programming language or
environment.

The above systems, devices, and methods have been described by way of
example and not by way of limitation with respect to improving accuracy,
processor speed, and ease of user interaction, etc. with a navigation device 200.
Further, elements and/or features of different example embodiments may be
combined with each other and/or substituted for each other within the scope of
this disclosure and appended claims.

Still further, any one of the above-described and other example features of the
present invention may be embodied in the form of an apparatus, method,
system, computer program and computer program product. For example, of the
aforementioned methods may be embodied in the form of a system or device,
including, but not limited to, any of the structure for performing the
methodology illustrated in the drawings.

Example embodiments being thus described, it will be obvious that the same
may be varied in many ways. Such variations are not to be regarded as a
departure from the spirit and scope of the present invention, and all such
modifications as would be obvious to one skilled in the art are intended to be
included within the scope of the following claims.
CLAIMS

1. A method, comprising:
   connecting a navigation device, located in a vehicle, to a server;
   characterized by the further steps of
   transmitting information relating to changes in position and speed of the vehicle
   to the server; and
   receiving information, relating to potential delays along a route of travel of the
   vehicle, from the server, the received information being determined based at
   least partially upon information relating to changes in position and speed
   transmitted from navigation devices of a plurality of vehicles.

2. The method of claim 1, wherein the connection is established between a
   modem within the navigation device and the server.

3. The method of any preceding claim, wherein the transmitting occurs at
   a time different from the receiving.

4. The method of any preceding claim, wherein the information is received
   periodically.

5. The method of claim 4, wherein the periodic receipt is every three
   minutes.

6. The method of claim 3, 4 or 5, wherein, the information is transmitted
   from the navigation device based upon requests for information uploads from
   the server.

7. The method of any preceding claim, further comprising:
   determining a route of travel of the vehicle, based upon at least a desired
   destination and a current location of the vehicle; and
determining, subsequent to receipt of the information relating to potential delays along the route of travel of the vehicle, a revised route of travel based upon the received information.

8. The method of claim 7, further comprising:
   displaying an indication of potential delays along the route of travel of the vehicle, subsequent to receipt of the information relating to potential delays along the route of travel of the vehicle; and
   determining, upon receiving a request to calculate a revised route of travel, a revised route of travel based upon the received information.

9. The method of any preceding claim, further comprising:
   storing information relating to changes in position and speed of the vehicle, wherein the stored information is subsequently transmitted from the navigation device.

10. The method of any preceding claim, wherein information is transmitted from or received by the navigation device in an initial start-up sequence utilising a device type code, as part of the connection between the navigation device and the server.

11. The method of claim 10, wherein the information transmitted from the navigation device is useable by the server to identify the navigation device, to identify intended vehicle usage and vehicle type based upon the identified navigation device, and to increase at least one of mathematical accuracy and reliability in the information received by the navigation device, relating to potential delays along the route of travel of the vehicle.

12. The method of claim 11, wherein the information transmitted from the navigation device is further useable by the server to determine traffic patterns and potential delays along the route of travel of the vehicle.
13. The method of claim 11, wherein the information transmitted from the navigation device is further useable by the server to improve defining of traffic behavior, to further determine traffic patterns and potential delays along the route of travel of the vehicle, and to aid the navigation device in providing a revised route of travel based upon the received information.

14. The method of claim 10, wherein the information transmitted from the navigation device is useable to determine a category type of the navigation device.

15. The method of claim 14, wherein the category type of the navigation device includes at least one for commercial usage, consumer usage, motorcycle usage, and pedestrian usage.

16. The method of claim 15, wherein the information transmitted from the navigation device is useable to determine traffic behavior and expected flow patterns with enhanced accuracy and predictive methods, due to increased signal node identification.

17. The method of any preceding claim, wherein the connection between the navigation device and the server is a Network Interface Protocol connection.

18. A navigation device adapted to perform any of the methods of claims 1-17, comprising:
a modem to connect said navigation device, located in a vehicle, to a server;
a transmitter to transmit information relating to changes in position and speed of the vehicle to the server; and
a receiver to receive information, relating to potential delays along a route of travel of the vehicle, from the server, the received being determined based at least partially upon information relating to changes in position and speed transmitted from navigation devices of a plurality of vehicles.
19. The navigation device of claim 18, wherein the transmitter and receiver are part of a combined transceiver.

20. The navigation device of claim 18 or 19, wherein the modem is in an adapter of the navigation device.

21. The navigation device of claim 18 or 19, wherein the modem is in a body of the navigation device.

22. The navigation device of claim 19, wherein the transceiver is useable to transmit at a time different from the receiving by the receiver.

23. The navigation device of any of claims 18-22, further comprising:
   a processor to determine a route of travel of the vehicle, based upon at least a desired destination and a current location of the vehicle and to determine, subsequent to receipt of the information relating to potential delays along the route of travel of the vehicle, a revised route of travel based upon the received information.

24. The navigation device of any of claims 18-23, further comprising:
   a display to display an indication of potential delays along the route of travel of the vehicle, subsequent to receipt of the information relating to potential delays along the route of travel of the vehicle.

25. The navigation device of any of claims 18-24, further comprising:
   a memory to store information relating to changes in position and speed of the vehicle for subsequent transmission to the server.
Fig. 1
Fig. 2
Fig. 4A
unit rotates when on dock

push button to release

**Fig. 4B**
Fig. 7
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. 608G1/01 608G1/0968 601C21/26

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)

608G 601C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and where practical, search terms used)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Further documents are listed in the continuation of Box C. 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
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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- "X" document of particular relevance; the claimed invention could not 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 could not 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.
- "A" document member of the same patent family

Date of the actual completion of the international search: **30 April 2008**

Date of mailing of the international search report: **09/05/2008**

Name and mailing address of the ISA/
European Patent Office, P.B. 5316 Patentlaan 2 NL– 2280 HN Hilversum Tel. (+31–70) 340-2040, Tx. 31 651 epc ni, Fax: (+31–70) 340-3016

Authorized officer
Flores-Jíménez, A
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