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(71) Applicant *(for all designated States except US)*: HELSINGIN PUHELIN OYJ – HELSINGFORS TELEFON ABP [FI/FI]; Korkeavuorenkatu 35–37, FIN–00130 Helsinki (FI).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: ISOTALO, Lauri [FI/FI]; Kauppakartanonkatu 15 B 19, FIN–00930 Helsinki (FI).

(74) Agent: SEPPO LAINE OY; Itämerenkatu 3 B, FIN–00180 Helsinki (FI).

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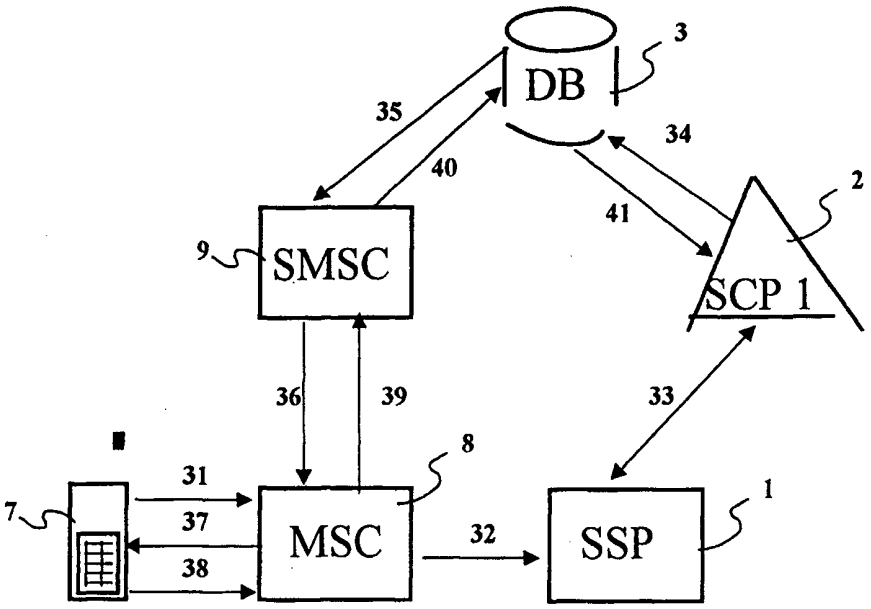
(57) Abstract

The present invention is based on defining the location of a connection (7) by means of coordinates. The coordinate system employed is advantageously a conventional coordinate system, in which the location can be resolved by the subscriber (7) or network terminal device using the connection (7) with the help of, e.g., a satellite positioning system. According to the invention, the coordinates of the connection (7) are transmitted from the connection over the telecom network to a location data base (3) maintained by at least one telecom operator. When calls are routed according to the invention, the location of the A– or B–subscriber, or even of both parties, are analyzed by retrieving the coordinates of the respective connection (7) from the location data base (3). If so needed, the coordinates are interpreted with another data base, called a linking data base, where the coordinates and geographical areas are linked with each other. In a service resolving the A–subscriber location, the incoming call can be routed, e.g., to the telephone exchange of the firm owning the destination extension and the location coordinates of the A–subscriber or the geographic area of the calling party can be transmitted over a communication channel to the called firm to be used in internal call forwarding. The location of the calling party and the call forwarding routine linked thereto may also be exhaustively analyzed and defined in the system of the telecom operator with the provision that authorization to such an operation has been given.



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Method for routing calls based on subscriber's location

The invention relates to a method according to the preamble of claim 1 for updating subscriber location. The invention also concerns methods according to the preambles of claims 5 and 14 for routing a call on the basis of subscriber location.

These kinds of methods are employed in such telecom services or similar functions in which the location of the A-subscriber and the B-subscriber are important factors in the execution of the service or other similar function. The location data of the A-subscriber can be utilized when, e.g., calls placed on the nation-wide number of a firm are to be routed to local offices of the firm that are located closest to the calling party. Respectively, the location data of the B-subscriber can be utilized when, e.g., announcements or advertisements are desired to be transmitted over telecommunication channels to connections located within a given geographical area.

In the prior art, the location of a subscriber has been resolved in wireline telephone networks on the basis of the A-subscriber identity and the address data linked thereto in a corresponding data base. In this fashion, it has been possible in a wireline telecommunications network to define a certain geographical area separately from other areas by compiling the subscriber number plans of said area into a look-up table. The look-up table compilation method of A-subscriber numbers can be employed to create most comprehensive and useful control arrangements with the provision that the A-subscriber number spaces of the different geographical areas are definable in a unique fashion. This must be understood so that all the numbers of subscriber connections within a given area begin with the same sequence of digits. In Finland, it has also been possible to utilize the data base of a nation-wide directory assistance service. In mobile telephone networks, however, the location the calling party cannot be resolved on the basis of the A-subscriber identity, because mobile telephone users can typically move over large areas both domestically and abroad. The situation is further complicated by the fact that mobile telephones are frequently

used abroad by roaming in the networks of nonlocal operators.

Conventionally, it has been possible to resolve the location of a mobile telephone unit used in the network of a local operator from the location information, or cell identification data, submitted by the operator's mobile telephone network. Hereupon, the operator has known the mobile telephone unit location by the area of the network cell currently serving the subscriber. If subscriber location has been desired to be resolved with a greater precision that at the cell level alone, it has been possible to redefine the location of the mobile telephone by combining the information obtained from three neighboring mobile telephone network cells closest to that serving the subscriber. Analogously to the wireline telephone network techniques, it has also been possible to compile table associated with given geographical areas. Herein, the geographical areas have been determined from the cell identification data of the mobile telephone network.

The prior-art techniques have been hampered by the need to maintain separate systems for resolving the location of wireline connections and mobile telephones.

A further problem of the conventional resolution method of subscriber location in wireline networks is that the method is based on the assumption that the number identities of A-subscribers within a given geographical area can be compiled into a look-up table in the above-described fashion. However, the fact today is that the numbers identifying the A-subscribers within a certain area are typically scattered over number series beginning with different digit sequences, where it is no more possible to manage the number spaces of A-subscribers by the decadic number series, but instead an exhaustive list of allocated A-subscriber numbers is needed. The compilation and updating of such a look-up list is extremely awkward and prone to error. Moreover, this type of system requires continuous and fast data transfer between the administrative and call routing data bases of different telecom operators in the case that the service is intended to be available also across the operating boundaries of different telecom operators. Furthermore, the conventional technique

of compiling subscriber numbers into look-up tables on the basis of locally allocated number series is not feasible in the future, because number portability to be implemented over all telecom networks will undermine this kind of number look-up table approach. Obviously, as all subscribers in the near future will have the possibility of porting the telephone number of their subscriber connection when moving from one place to another, the telephone number look-up lists of A-subscriber identities in different geographical areas are subject to change frequently.

Respectively, the method conventionally used in a mobile telephone network for resolving the location of a mobile telephone unit is problematic. Also in mobile telephone networks, subscriber location data or cell identification codes in database tables must be updated on a continuous basis, because the cell area dimensions of radio networks require frequent readjustments with the development of the network, whereby new cell identification codes must be allocated and obsolete ones deleted. Furthermore, it is possible that cell overlap must be altered dynamically with the daily traffic peaks. Moreover, resolving a subscriber location on the basis of cell identification codes is not possible over the network limits of different telecom operators, because the geographical locations of cells and the respective cell identification codes of one mobile telephone operator are not accessible to other telecom operators.

It is an object of the present invention to overcome the above-described drawbacks and to provide entirely novel types of methods for updating the location data of a subscriber connection in a telephone network, for determining the location area of the connection, as well as for routing calls on the basis of the subscriber location data.

The goal of the invention is attained by virtue of using coordinates for defining the location of a subscriber connection. The coordinate system employed herein is advantageously a conventional coordinate system, in which the location of any connection can be resolved with the help of, e.g., a satellite positioning system by the

subscriber or network terminal device using the connection. According to the invention, the coordinates of the connection are transmitted from the connection over the telecom network to a location data base maintained by at least one telecom operator. When calls are routed according to the invention, the location of the A-subscriber and/or the B-subscriber, or even of both parties as required are analyzed by retrieving the coordinates of the respective connection from said location data base. If so needed, the coordinates can be interpreted with the help of linking data stored in another data base, called a linking data base, where the coordinates of the connection corresponding to given geographical areas are linked with each other. In a service resolving the A-subscriber location, the incoming call can be routed, e.g., to the telephone exchange of the firm owning the destination extension and the location coordinates of the A-subscriber or the geographic location area of the calling party that are/is resolved from the coordinates can be transmitted over a communication channel to the called firm in order to aid the firm's internal call forwarding. The location of the calling party and the call routing routine linked thereto may also be exhaustively analyzed and defined in the system of the telecom operator with the provision that authorization to such an operation has been given.

More specifically, the methods according to the invention are characterized by what is stated in the characterizing parts of claims 1, 5 and 14.

The invention offers significant benefits.

The invention facilitates both wireline and mobile telephone networks to perform an accurate and reliable call routing based on resolving the locations of the A- and/or the B-subscriber.

The embodiments of the invention which utilize satellite positioning systems have the additional advantage that, when so desired, the method is applicable in any geographical location inasmuch satellite positioning systems are today globally deployed. The association of subscribers from wireline and mobile telephone

networks into users of the service is not dependent on the telecom operator or the country of the subscribers with the assumption that their local telecom operator can transfer the A-subscriber number of the calling party and the coordinate information to the location data base of the telecom operator actually providing the routing service. This feature is particularly useful for travelers located abroad and having their mobile telephone with them. The location of mobile telephone units may also be of great use in internationally operating firms inasmuch the invention gives the firms a method for globally locating their employees traveling abroad. Thus, the firm can easily check, e.g., whether any of their people is located in a given country.

When the invention is applied so that the operator providing the caller-location-based call control service can utilize the directory assistance service data base of the operator serving the subscriber, the location information of the subscriber using the caller-location-based call control service can be linked to a plurality of different geographical values. Thus, it is possible to determine, e.g., the county, city or community in which the calling party resides. When so desired, the subscriber location may also be refined down to the zip code, city area or, in the most accurate systems, the street address. Then it is easy to offer the calling party, e.g., a service capable of telling his exact location in a proper format within the resolution limits of the satellite positioning system.

If the invention is applied in an alternative manner so that the subscriber location data is linked with the information systems of the service-providing operators, the service providers can by themselves in a flexible manner design and maintain call routing lists suited to serve their own applications. Then, a call placed to the service number of a gas station operator can be directed to, e.g., the operator's gas station which is open closest to the caller or, similarly, a call placed to a pizzeria chain number can be directed to a pizzeria closest to the caller. This advantageous embodiment allows the invention to be used for routing calls placed to the numbers of a great variety of different firms, organizations and authority bodies.

The invention may also be applied so that a location data base is first searched for subscriber numbers fulfilling certain criteria as to their location. The subscriber number list thus obtained can be used as such or compared with information retrieved from some other data bases in order to limit the amount of numbers in the subscriber list. Next, announcements or advertisements can be transmitted to the subscriber numbers of the thus selected group, whereby the announcements or advertisements are focused to subscribers having a connection within a desired geographical area. By this type of embodiment, the invention makes it possible to select, e.g., mobile telephone units located within a given area of the city and to send within said area a text message to all the mobile telephone connections that support the function of the subscriber location resolution service. Transmission to selected wireline connections can be accomplished with the help of a human operator or, e.g., robotic calling machine.

In regard to subscriber number portability in wireline telephone networks, an advantageous embodiment of the invention makes it possible for the subscriber to personally update in simple manner the link between the coordinates of his new living or stay location and the number corresponding to his A-subscriber identity, whereby call routing to the new location of the ported number will be effective without delay.

The development in microelectronics and mobile telephone technology over recent years has also facilitated the integration of device receiving satellite positioning data with a mobile telephone into a single unit. US Pat. No. 5,786,789 also discloses a modular combination unit having the mobile telephone unit and the GPS unit implemented detachable from each other. The mobile telephone unit described in cited publication can be used for sending position-locating data from the mobile telephone to the public telephone network. One advantageous embodiment of the present invention uses a mobile telephone equipped with a satellite positioning system device such as a GPS receiver. In this advantageous embodiment, the combination mobile telephone-satellite positioning system receiver is programmed to send its positioning data automatically to the subscriber location data base.

In the following, the invention is described in more detail with reference to exemplifying embodiments illustrated in appended drawings in which

Fig. 1 illustrates a method according to the invention, wherein the location data base is updated from a wireline network connection;

Fig. 2 illustrates a method according to the invention, wherein a call is routed on the basis of subscriber location resolved from a wireline telephone network connection;

Fig. 3 illustrates a method according to the invention, wherein the location data base is updated at the instant a subscriber activates the location-based call control service from a mobile telephone network;

Fig. 4 illustrates a method according to the invention, wherein the location data base is updated at the instant the location of a subscriber calling from a mobile telephone network changes; and

Fig. 5 illustrates a method according to the invention, wherein a call is routed on the basis of subscriber location resolved from a mobile telephone network.

In the description of the invention and in the claims, the term A-subscriber is used for making reference to the telephone connection from which the call is initially placed. Respectively, the term A-subscriber identity is used for making reference to the identifying code of the caller's telephone connection in a public telephone network. The identifying code may be numeric, for instance. The numeric A-subscriber identity code is also referred to as the A-subscriber number.

Respectively, in the description of the invention and in the claims, the term B-subscriber is used for making reference to the telephone connection to which the call is routed after possible call control operations. Hence, while starting a call and

dialing a telephone number at the A-subscriber end, it is not yet necessarily known to which particular B-subscriber the call is to be connected. Thus, the call may address a group of potential B-subscribers, among which the B-subscriber (or possibly even a plurality of B-subscribers) will be selected. Accordingly, the B-subscriber connection in the context of the present invention must be understood to represent some type of destination connection for the call.

Referring to Fig. 1, the system shown therein comprises an SSP (Service Switching Point) 1 in an intelligent telephone network, an SCP (Service Control Point) data base 2 controlling the operation of the SSP 1, and a location data base 3 connected over a communication channel to said SCP data base 2. Furthermore, the system shown in Fig. 1 includes a local exchange 6 of the telephone network and a wireline connection 5 interfaced to the same.

The method illustrated in Fig. 1 can be used when, e.g., a subscriber connected to a wireline telephone network decides to become a user of the location-based call control service or moves his connection to another location. Using the method of Fig. 1, the following steps are performed when the location data base is updated over a wireline telephone connection:

11) The subscriber of a wireline network calls from his connection 5 to a location-based call control service activation number, whereby his terminal establishes a connection to his local exchange 6.

12) The call is directed from the local exchange 6 to the closest SSP switching center 1, and thereupon the SSP switching center 1 triggers the location-based call control service to serve the service activation number.

13) The SSP switching center 1 performs a query to the SCP data base 2 for further steps in the redirection of the call. The SCP data base 2 requests the SSP switching center 1 to issue a suitable message for performing the service

activation. The SSP switching center 1 registers, according to the instructions issued by the SCP data base 2, digits dialed in the dual-tone multiple-frequency format by the subscriber. The subscriber selects to activate the location-based call control service for his subscriber number 5. The subscriber dials his local coordinates according to instructions issued to him.

14) The SCP data base 2 updates the callers' A-subscriber identity 5 and local coordinates in the location data base 3.

The subscriber of a wireline telephone network can obtain the coordinates of his location using a satellite positioning system receiver, for instance. E.g., if a GPS satellite positioning system is utilized, the location-based call control system can be adapted to function according to the coordinate convention employed in the GPS satellite positioning system, whereby the subscriber can submit the parameter values of his location directly in same format as given by the GPS receiver. However, there is no particular reason for the use of the GPS positioning system in conjunction with the present invention, but it is equally possible to apply the invention in conjunction with other satellite positioning systems such as the GLONASS. When the subscriber decides to log into the location-based call control service, the location coordinates of the subscriber's wireline connection 5 can be sent to the telecom operator of the service either directly or by placing a call to a specific service number.

The system shown in Fig. 2 comprises the system of Fig. 1 complemented with a linking data base 4 that is connected over a communication channel to the SCP data base 2. The linking data base 4 can be, e.g., a data base used by a directory service having, e.g., subscriber numbers and the corresponding subscriber identities and addresses stored therein. Obviously, the linking data base 4 may also contain other information or be based on an entirely different information content. For instance, the linking data base 4 may contain information on the country, county, community, city or street address to be linked with a set of given coordinates.

The linking data base 4 can be utilized, e.g., so that the location data retrieved from the location data base 3 triggers a query to the linking data base 4, and the response is a geographical area or other information corresponding to the location information given in the coordinate format. Later in this application, such geographical information corresponding the coordinates will be referred to as location area information. The information thus retrieved can be further utilized for routing the call ahead. The retrieved information may also be transmitted, when so desired, from the SCP data base to, e.g., the terminal device of the call destination connection, the service provider's information system or an automatic voice response unit.

Using the method of Fig. 2, the following steps are performed when the location data of a wireline telephone network subscriber is used for routing a call:

21) The subscriber dials a number having its call control linked with the location-based call control service.

22) The call is directed to the closest SSP switching center 1, and thereupon the SSP switching center 1 triggers the service for the dialed number.

23) The SSP switching center 1 performs a call control query to the SCP data base 2.

24) In the analysis of the dialed number, the SCP data base 2 detects that calls placed to the dialed number also require an analysis of the calling party's location, whereby a query is made to the location data base 3.

25) After receiving the coordinates of the calling party's location from the location data base 3, the SCP data base 2 retrieves the location area information from the linking data base 4 in a relevant format corresponding to the caller location coordinates. The SCP data base 2 uses the caller location area information related to the caller location for defining a

destination number determined by the control logic for the called number, a charging rate or other parameter. The SCP data base 2 transmits the SSP switching center 1 instructions for redirecting the call.

26) The SSP switching center 1 connects the call to the defined destination number.

27) The SCP data base 2 may, if so required, transmit information on the caller location coordinates or corresponding data retrieved from the linking data base 4 to the local telephone exchange or system, private branch exchange or voice response unit, answering at the destination number. This information is transmitted separately over the communications network.

The system illustrated in Fig. 3 is similar to those shown in Figs. 1 and 2 by comprising an SSP switching center 1, an SCP data base 2 and a location data base 3. In addition to these, the system of Fig. 3 includes a mobile telephone switching center 8 communicating with the SSP switching center 1, a short-message center 9 communicating with the mobile telephone switching center 8 and the location data base 3, and a mobile telephone connection 7 located within the coverage area of the mobile telephone switching center 8.

Advantageously, the mobile telephone connection 7 is used from a mobile telephone incorporating a satellite positioning device. The combination mobile telephone-satellite positioning device is programmed according to the advantageous embodiment so as to transmit changes in its position coordinates automatically. Herein, the mobile telephone sends its position data automatically to the location data base 3 whenever the coordinates of the mobile telephone location differ by a value defined in a predetermined rule from those of previously updated location data. In this fashion, the accuracy of updated data can be programmed desiredly within the confines of the resolution of the satellite positioning system used. Accordingly, the system disclosed herein makes it possible to implement a very accurate and almost

real-time updated monitoring of subscriber location. Alternatively, the location updating can be made at given intervals or the rule of coordinate updating can be formulated as a function of time and distance of position change.

The mobile telephone unit can update its location data using, e.g., short messages. The short messages are sent to the location data base 3 which may also be such a data base that is jointly used by several telecom operators. The location-based call control service can be activated by, e.g., placing an activation call by the mobile telephone network subscriber to a special service number, and by sending the subscriber location coordinates in a short message. After this first activation call, the subscriber's mobile telephone unit keeps sending the location data in the above-described manner until the service is inactivated.

Using the method of Fig. 3, the following steps are performed when the location data base is updated over a mobile telephone connection:

31) The subscriber using the mobile telephone unit calls from his connection 7 to a location-based call control service activation number.

32) The call is directed via the mobile telephone switching center 8 to the closest SSP switching center 1, and thereupon the SSP switching center 1 triggers the location-based call control service to serve the service activation number.

33) The SSP switching center 1 performs a query to the SCP data base 2 for further steps in the redirection of the call. The SCP data base 2 requests the SSP switching center 1 to issue a suitable message for performing the service activation. The SSP switching center 1 registers the dual-tone multiple-frequency digits dialed by the subscriber according to the instructions issued to him by the SCP data base 2. The subscriber selects to activate the location-based call control service for his subscriber number 7.

34) The SCP data base 2 requests the location data base 3 to activate the service for the subscriber's mobile telephone number 7.

35) The location data base 3 relays the activation request as a short message to the short-message center 9.

36) The short-message center 9 relays the short message to the mobile telephone switching center 8.

37) The mobile telephone switching center 8 sends the short message further to the mobile telephone unit used by the subscriber connection 7, thus activating the unit's system for satellite positioning information reception.

38) The mobile telephone unit used by the subscriber connection 7 sends the real-time coordinate values of its location as a short message to the mobile telephone switching center 8.

39) The mobile telephone switching center 8 sends the short message further to short-message center 9.

40) The short-message center 9 relays the short message to the location data base 3, where the coordinate information of the short message is interpreted and the correspondence link between the A-subscriber identity and its coordinates is updated.

41) The location data base 3 sends the SCP data base 2 an acknowledge message confirming successful activation of the location-based call control service. The SCP data base 2 requests the SSP switching center 1 to send an appropriate announcement to the caller confirming the operation.

The system illustrated in Fig. 4 is similar to that shown in Fig. 3 by comprising a

location data base 3, a mobile telephone subscriber connection 7, a mobile telephone switching center 8 and a short-message center 9.

Using the method of Fig. 4, the following steps are performed when the location data base is updated over a mobile telephone connection:

45) If the location-based call control service currently serving the mobile telephone connection 7 is already in active state, the movement of the mobile telephone connection 7 over a sufficiently long distance away from area defined for the connection by the location data base 3 on the basis of the coordinate values previously sent to the data base causes the mobile telephone unit to send a new short message with updated location data to the location data base 3.

46) The mobile telephone switching center 8 relays the short message to the short-message center 9.

47) The short-message center 9 relays the short message to the location data base 3 where the message is interpreted and the required updating of data is performed.

The system illustrated in Fig. 5 is similar to that shown in Fig. 3 and complemented in the same manner as in Fig. 2 with a linking data base 4 connected over a communication channel to the SCP data base 2.

Using the method of Fig. 5, the following steps are performed when call control is implemented on the basis of subscriber location in a mobile telephone network:

51) The subscriber using a mobile telephone connection 7 dials a number having its call routing linked with the location-based call control service.

52) The call is directed to the closest SSP switching center 1, and thereupon the SSP switching center 1 triggers the service for the dialed number.

53) The SSP switching center 1 performs a call control query to the SCP data base 2.

54) In the analysis of the dialed number, the SCP data base 2 detects that calls placed to the dialed number also require an analysis of the calling party's location, whereby a query is made to the location data base 3.

55) After receiving the coordinates of the calling party's location from the location data base 3, the SCP data base 2 retrieves the location area information from the linking data base 4 in a relevant format corresponding to the caller location coordinates. The SCP data base 2 uses the caller location area information for defining a destination number determined by the control logic for the called number, a charging rate or other parameter. The SCP data base 2 transmits the SSP switching center 1 instructions for redirecting the call.

56) The SSP switching center 1 redirects the call to the destination connection defined by the SCP data base 2.

57) The SCP data base 2 may if so required transmit information on the caller location coordinates or similar data retrieved from the linking data base 4 to the local telephone exchange or system, private branch exchange or voice response unit, answering at the destination number. This information is transmitted separately over the communications network.

Without departing from the scope and spirit of the invention, embodiments different from those described above may also be contemplated. While the afore-discussed call control method is based on the location of either the A-subscriber or the B-

subscriber, the invention may as well be utilized so that the call control occurs based on the locations of both parties. Such a call control based on both the A-subscriber's and the B-subscriber's location is practicable, e.g., for help service numbers, whereby a call received from, e.g., the driver of defective car on the road can be connected directly to a towing service firm's mobile telephone unit located closest to the car needing help. The same concept may also be applied to the control of distress calls. A call control service based on the analysis of A-subscriber and/or B-subscriber locations is also useful, e.g., for ordering a taxi service, whereby the subscriber using a mobile telephone can call for a taxi without knowing the address of his present location.

The above-described advantageous embodiments of the invention were illustrated using the conventional geographic coordinate system based on latitudes and longitudes for defining the position coordinates. However, the invention is equally well applicable in any other coordinate system. Hence, the term location coordinate data in the context of the present invention must be understood in a general sense referring to any such representation of position data that allows the location of a connection to be defined in a unique manner in a predetermined coordinate system with the help of, e.g., the values of two parameters.

What is claimed is:

1. Method for updating the location data of telephone network connection (5, 7), c h a r a c t e r i z e d by the steps of

- receiving over the telephone network the coordination-format location data of said connection (5, 7) as sent by a terminal which uses said connection (5, 7),

- identifying said connection (5, 7) associated with said coordinate-format location data, and

- storing in a location data base (3) said coordinate-format location data of said connection (5, 7) associated with the identification data of said connection (5, 7).

2. Method according to claim 1, c h a r a c t e r i z e d in that said location data is received from a terminal of a mobile telephone network as a short message sent by said terminal.

3. Method according to claim 1 or 2, c h a r a c t e r i z e d in that said location data received from said terminal is formed in the terminal, based on the location coordinates obtained from a satellite positioning system connected to said terminal.

4. Method according to any of claims 1 - 3, c h a r a c t e r i z e d in that the connection (5, 7) linked with the corresponding location data is identified from the A-subscriber number of the connection (5, 7) transmitted over the telephone network.

5. Method for routing a call based on the location of a subscriber connection, comprising the steps of

- identifying the connection of the A-subscriber from the A-subscriber identity,

- detecting the A-subscriber to have dialed such a telephone number, to which placed calls require the location of the A-subscriber connection to be analysed,

- retrieving the required location data of the A-subscriber connection from a location data base (3), and

- routing the call placed by the A-subscriber to the B-subscriber,

characterized by

- retrieving the required location data of the A-subscriber connection from said location data base (3) in a coordinate format.

6. Method according to claim 5, characterized by

- detecting the A-subscriber to have dialed such a telephone number, to which placed calls require, in addition to the location of the A-subscriber connection, the location of at least one B-subscriber connection, associated with the called number, to be analysed,

- retrieving the required location data of said at least one B-subscriber connection from said location data base (3) in coordinate format.

7. Method according to claim 6, characterized in that, steered by a control logic disposed for the use of an intelligent telephone network,

- the location data of the A-subscriber is compared with the location data of the potential B-subscribers, associated with the called number,

- based on the location data, a B-subscriber located closest to said A-subscriber is selected from the group of potential B-subscribers, and

- the call is connected to said B-subscriber located closest to said A-subscriber.

8. Method according to any of claims 5 - 7, c h a r a c t e r i z e d in that said coordinate-format location data retrieved from said location data base (3) is sent over a communication channel to the system used by the B-subscriber.

9. Method according to any of claims 5 - 8, c h a r a c t e r i z e d in that, with the help of intelligent telephone network means,

- the coordinate-format location data retrieved from said location data base (3) is compared with the control logic of the dialed number,

- a suitable B-subscriber connection is selected on the basis of said coordinate-format location data and control logic, and

- the call is directed to said selected B-subscriber connection.

10. Method according to claims 5 - 7, c h a r a c t e r i z e d in that from a linking data base (4) is retrieved in a relevant format such location area data that corresponds to the location data received in coordinate format.

11. Method according to claim 10, c h a r a c t e r i z e d in that the location area data retrieved from said linking data base (4) is transmitted over a communication channel to the system used by the B-subscriber.

12. Method according to claim 10, c h a r a c t e r i z e d in that the location area data retrieved from said linking data base (4) is transmitted to the connection used by

the A-subscriber.

13. Method according to claim 10, c h a r a c t e r i z e d in that, with the help of intelligent telephone network means,

- the location area data retrieved from said linking data base (4) is compared with the control logic of the dialed number,
- a suitable B-subscriber connection is selected on the basis of said location area data and control logic, and
- the call is directed to said selected B-subscriber connection.

14. Method for routing calls based on the location of the subscriber connection, in which method the connection is identified from the subscriber identity, c h a r a c - t e r i z e d by

- detecting the A-subscriber to have dialed such a telephone number, to which placed calls require the location of at least one B-subscriber connection, associated with the called number, to be analysed,
- retrieving the required location data of the at least one B-subscriber connection in coordinate format from a location data base (3), and
- routing the call placed by the A-subscriber to the B-subscriber.

15. Method according to claim 14, c h a r a c t e r i z e d in that

- detecting the A-subscriber to have dialed such a telephone number, to which placed calls require, in addition to the location of at least one B-subscriber connection associated with the called number, the location of the A-subscriber

connection to be analysed,

- retrieving the required location data of the A-subscriber connection in coordinate format from said location data base (3).

16. Method according to claim 15, c h a r a c t e r i z e d in that, steered by a control logic disposed for the use of the intelligent telephone network,

- the location data of the A-subscriber is compared with the location data of potential B-subscribers associated with the called number,

- based on the location data, the B-subscriber located closest to said A-subscriber is selected from the group of said potential B-subscribers, and

- the call is connected to said B-subscriber located closest to said A-subscriber.

17. Method according to any of claims 14 - 16, c h a r a c t e r i z e d in that the coordinate-format location data retrieved from said location data base (3) is transmitted over a communication channel to the system used by the B-subscriber.

18. Method according to any of claims 14 - 17, c h a r a c t e r i z e d in that, with the help of intelligent telephone network means,

- the coordinate-format location data retrieved from said location data base (3) is compared with the control logic of the dialed number,

- a suitable B-subscriber connection is selected on the basis of said coordinate-format location data and control logic, and

- the call is directed to said selected B-subscriber connection.

19. Method according to any of claims 14 - 16, c h a r a c t e r i z e d in that location area data, corresponding to the location data in coordinate format and being in a relevant format, is retrieved from a linking data base (4).

20. Method according to claim 19, c h a r a c t e r i z e d in that the location area data retrieved from said linking data base (4) is transmitted over a communication channel to the system used by the B-subscriber.

21. Method according to claim 19, c h a r a c t e r i z e d in that the location area data retrieved from said linking data base (4) is transmitted to the connection used by the A-subscriber.

22. Method according to claim 19, c h a r a c t e r i z e d in that, with the help of intelligent telephone network means,

- the location area data retrieved from said linking data base (4) is compared with the control logic serving the dialed number,
- a suitable B-subscriber connection is selected on the basis of said location area data and control logic, and
- the call is directed to said selected B-subscriber connection.

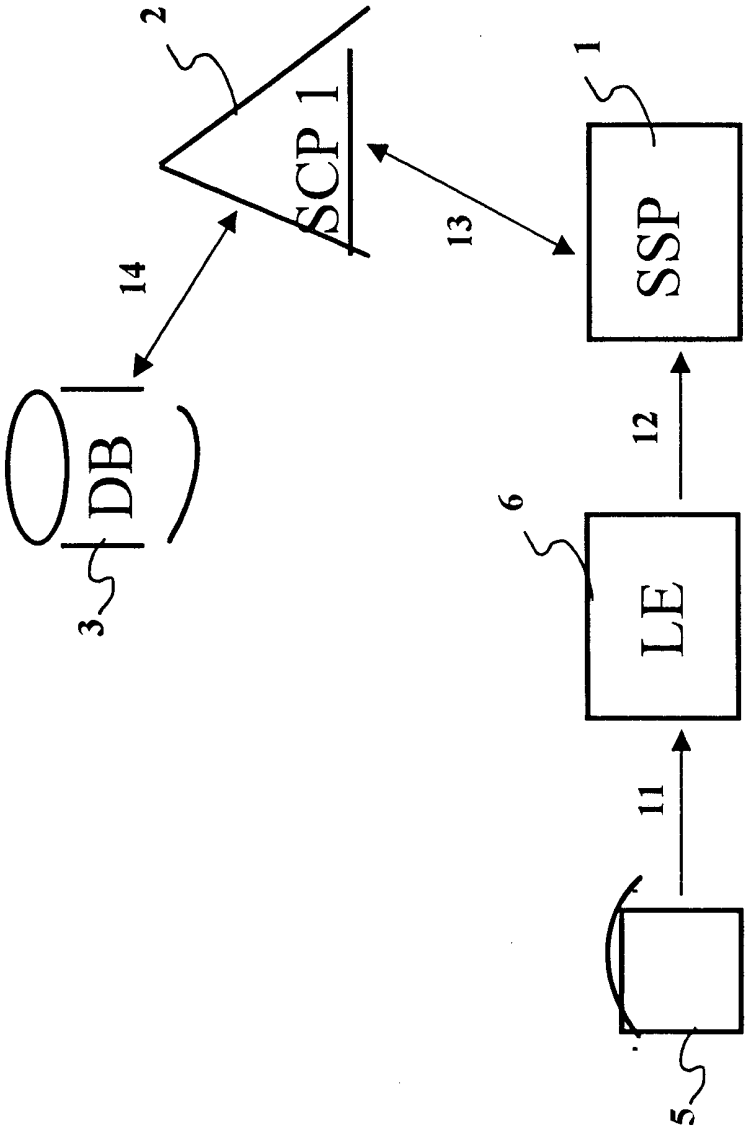

Fig. 1

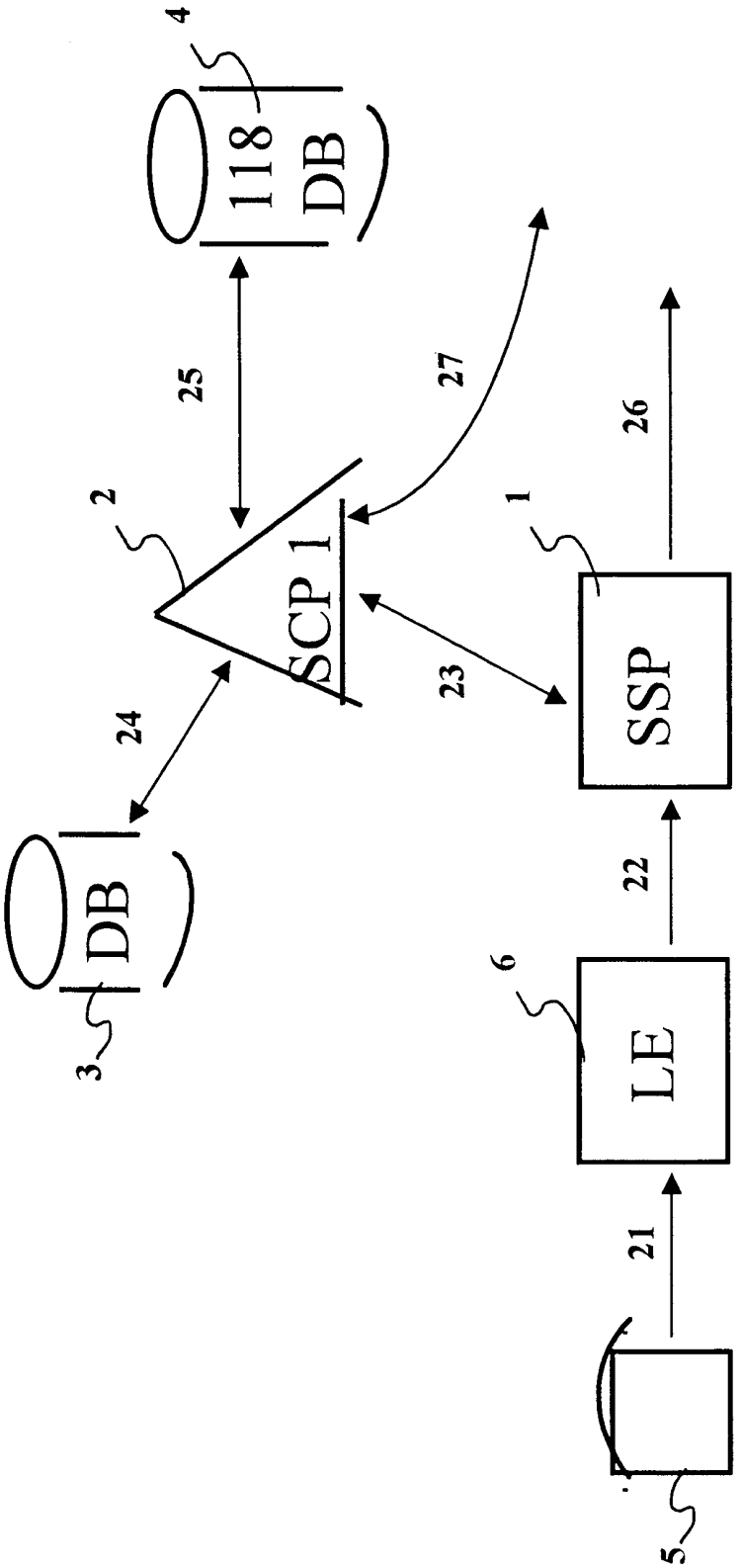

Fig. 2

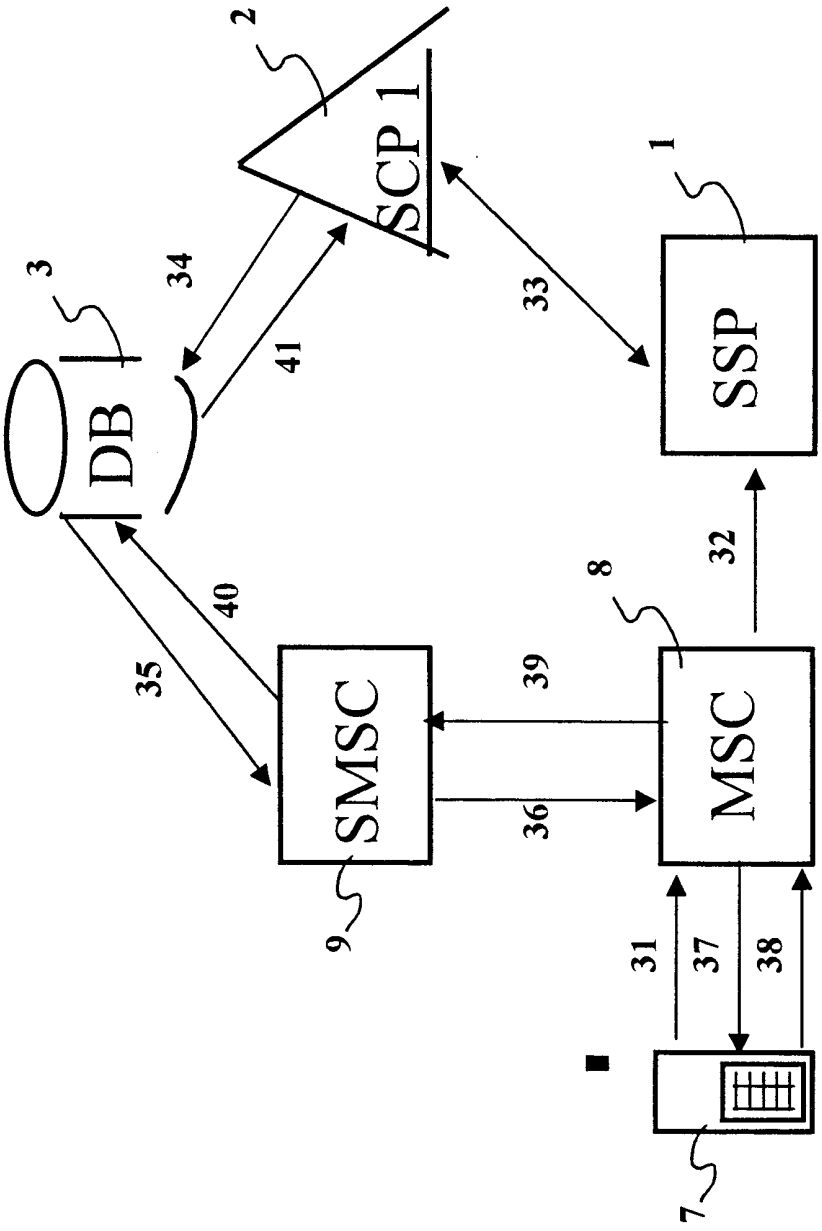

Fig. 3

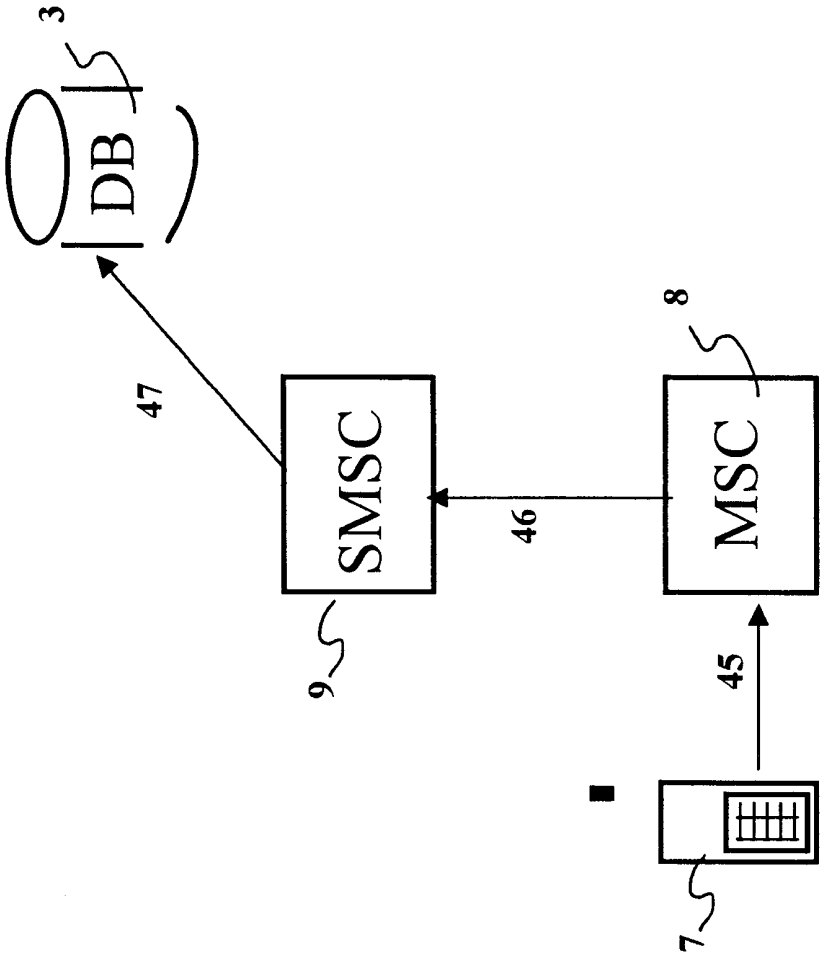

Fig. 4

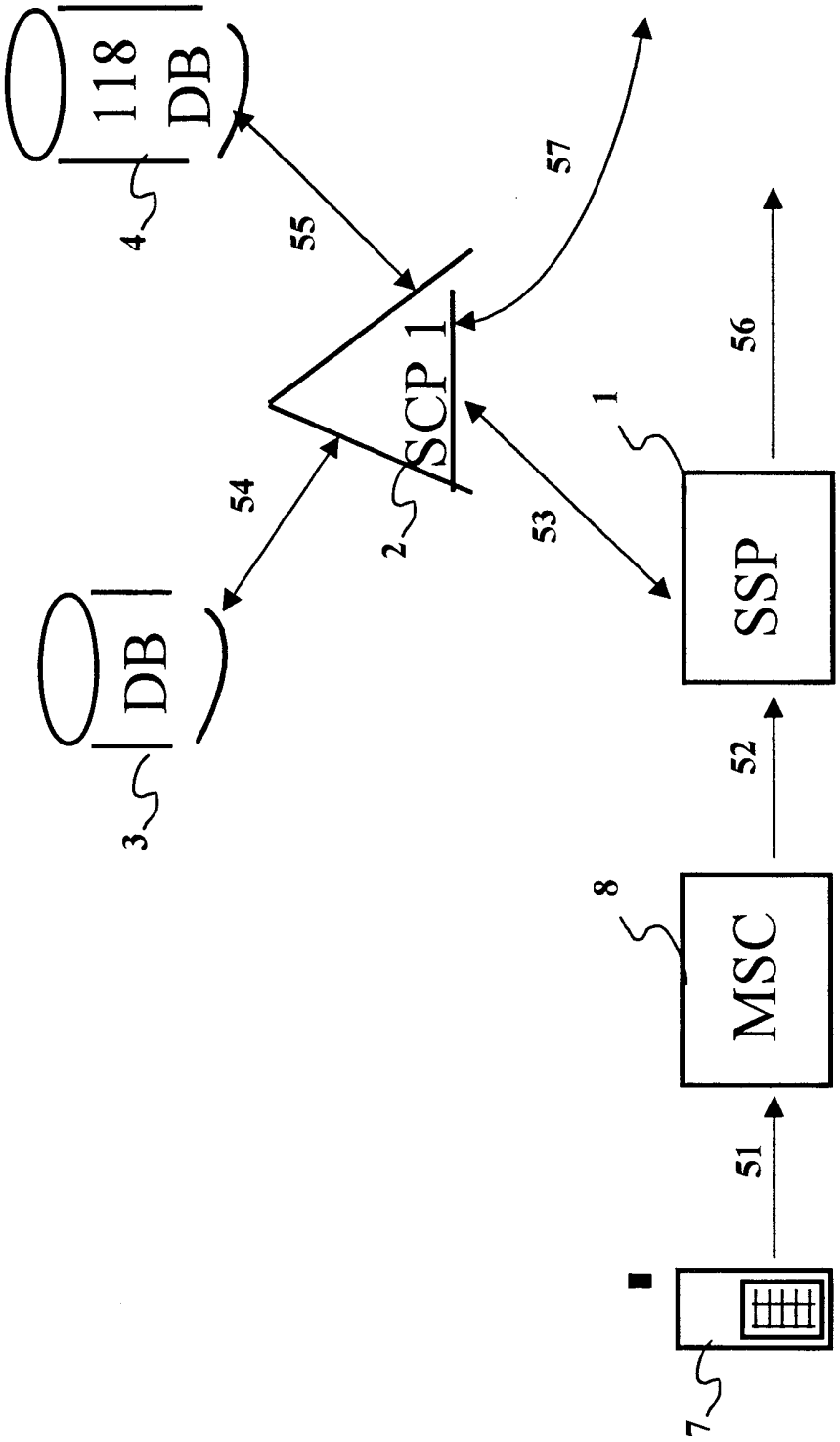

Fig. 5

INTERNATIONAL SEARCH REPORT

Int ational application No.
PCT/FI 99/00838

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38, H04M 11/06
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)

IPC7: H04Q, H04M

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9427398 A1 (DENNISON,EVERETT), 24 November 1994 (24.11.94), page 5, line 15 - page 6, line 15, claim 1, abstract ---	1-22
X	WO 9535636 A1 (GTE LABORATORIES INCORPORATED), 28 December 1995 (28.12.95), page 17, line 35 - page 18, line 6, claims 1,5, abstract ---	1-22
X	US 5588048 A (DANIEL E. NEVILLE), 24 December 1996 (24.12.96), claims 9,10, abstract --- --------	1-22

☐ 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" erlier document but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"Y" document of particular relevance: the claimed invention cannot 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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 March 2000	09 -03- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jack Hedlund/Els Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/FI 99/00838

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9427398 A1	24/11/94	AU 6772994 A	12/12/94
		US 5546445 A	13/08/96
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WO 9535636 A1	28/12/95	CA 2169955 A	28/12/95
		EP 0714589 A	05/06/96
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US 5588048 A	24/12/96	US RE36111 E	23/02/99
		US 5805689 A	08/09/98