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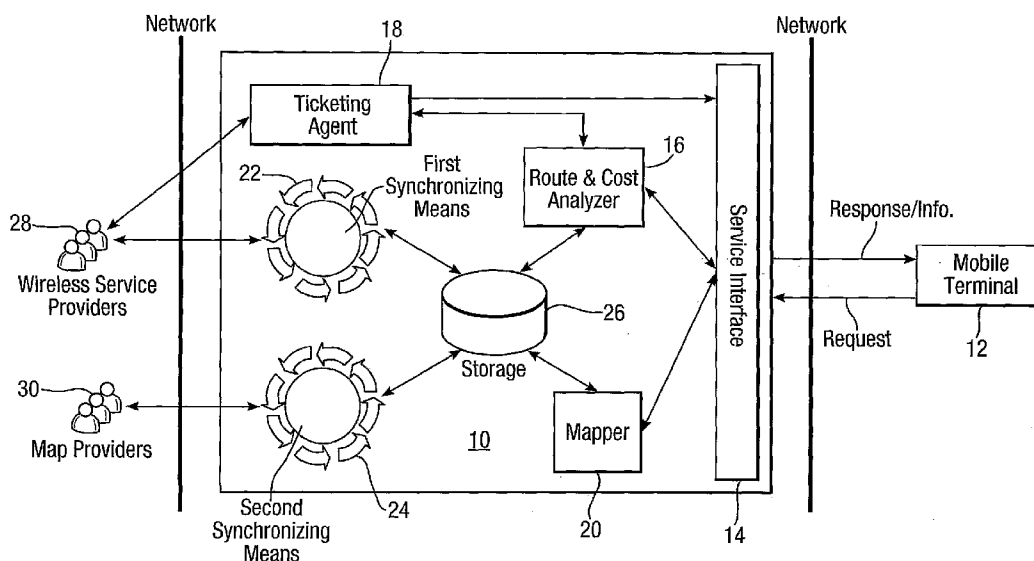
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(54) Title: SYSTEM AND METHOD FOR PROVIDING CONTINUOUS WIRELESS ACCESS



(57) Abstract: A system (10) for providing substantially continuous wireless access to a mobile terminal (12) is described. The system (10) includes an interface (14), generation means (16) and ticketing means (18). The interface (14) is configured to receive a request from the mobile terminal (12), the request specifying an origin and a destination of the mobile terminal (12). The generation means (16) is configured to generate a service combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers along the route. The ticketing means (18) is configured to generate a ticket for the route according to the service combination, the ticket giving the mobile terminal (12) access privilege along the route.

System and Method for Providing Continuous Wireless Access

Technical Field

The present invention relates to wireless communications, and more particularly to a system and method for providing substantially continuous wireless access.

Background to the Invention and Prior Art

Wireless services are becoming increasingly widespread. As such, it is anticipated that wireless services will eventually be accessible at any place, time and quality. Already in certain areas, particularly in high density urban areas, a mobile user at one location is able to choose from more than one wireless Internet service provider (WISP). A large majority of existing WISPs rely on Wireless Local Area Network (WLAN) technology based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standards to provide network access. However, Worldwide Interoperability for Microwave Access (WiMAX) technology based on the IEEE 802.16 standards is expected to play a more dominant role in providing affordable and faster wireless Internet access over a larger coverage area. Presently, most wireless devices such as Personal Digital Assistant (PDA) phones are capable of supporting multiple air interfaces, for example, IEEE 802.11, Global System for Mobile Communications (GSM), Bluetooth, etc. WiMAX compliant mobile devices have also been introduced. With mobile devices supporting multiple air interfaces, it is anticipated that end users will in future be able to enjoy a wider choice of WISPs across diverse underlying technologies.

At present, WISPs are usually operated by different operators which have little or no formal cooperation with one another. An existing prepaid or postpaid account is often required to gain access to these commercial WISPs. In some cases, wireless access may be granted by a WISP when a user makes a one-off online payment with a credit card. Because the available WISPs change from one location to another, there is often no continuity of wireless Internet services when a user travels from one place to another across a large geographical area. This is a major inconvenience for users on the move as mobile users have to manually reconnect or logon again if they wish to continue using Internet services on entering a coverage area of another WISP. Additionally, an access privilege issued by the operator of the other WISP is required for reconnection or to logon again.

Referring to earlier patent documents, Japanese application JP 2006-108921 relates to a vehicle-mounted terminal device which is intended to allow better radio wave reception while a vehicle is being driven. A plurality of routes from a current position to a destination are retrieved, position information from the start point to the end point of each route is collated with information from an electric field intensity database, and a route is selected which allows reception of radio waves having an electric field intensity level above a reference level during a travel from the current vehicle position to the destination.

United Kingdom application GB 2 407 003 relates to wireless communications systems, particularly with apparatus, methods and computer program code for establishing wireless communication links. When a cellular or wireless device is switched on or requires a service, it carries out a search for available infrastructure, e.g. a base station in a cellular system or an access point in a WLAN, which can be time-consuming. This document discloses systems which aim to reduce this acquisition time by storing a list of previously communicated with devices and attempting to connect with a device in the stored list before scanning the area for devices.

United States application US 2001/034232 relates to a method of registering a location in a mobile communication system. When a base station ID defined by notification information changes, or when a predetermined period of time has passed, the base station ID is stored in the history of a mobile device. From the latest history, base stations near which the mobile device has a possibility of passing next are predicted, and predicted base stations are stored as a personal location registration area. Based on the history, the personal location registration area is extracted so as to perform a location registration operation which can be performed with the optimum personal location registration area for the movement pattern of the mobile device. Call signal traffic can thus be reduced without increasing the location registration signal traffic.

In view of the foregoing, it would be desirable to have a system and method for providing substantially continuous wireless access to a mobile terminal traversing across a geographical area serviced by diverse or different wireless service providers.

Summary of embodiments of the Invention

From a first aspect there is provided a system for providing substantially continuous wireless access to a mobile terminal, the system comprising: an interface configured to receive a request from the mobile terminal, the request specifying an origin and a destination of the mobile terminal; generation means configured to generate a service

combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers along the route; and ticketing means configured to generate a ticket for the route according to the service combination, the ticket giving the mobile terminal access privilege along the route.

Embodiments of the invention according to the first aspect provide a system for providing substantially continuous wireless access to a mobile terminal traversing across a geographical area serviced by diverse wireless service providers. Advantageously, the present invention allows a mobile user to move between coverage areas of different wireless service providers along a route without having to manually reconnect or logon again.

In one embodiment of the invention, the system includes mapping means configured to map wireless service provider information to topological information to generate information on the wireless service providers at respective locations along the route. The generation means may be configured to compile the information on the wireless service providers at the respective locations along the route to generate the service combination for the route.

In one embodiment of the invention, the system includes first synchronisation means configured to update the wireless service provider information. The first synchronisation means may be configured to update the wireless service provider information on receiving a wireless service provider synchronisation request from one of the wireless service providers. In one embodiment of the invention, the system includes second synchronisation means configured to synchronise the topological information with a plurality of map providers. The second synchronisation means may be configured to synchronise the topological information with the map providers on receiving a map provider synchronisation request from one of the map providers. Updating of the wireless service provider information and synchronisation of the topological information with the map providers ensures that an accurate and up to date collection of information is maintained in the storage means. This in turn ensures that the service combinations generated by the system and method of the present invention are current, thus guaranteeing wireless access to the mobile terminal along the route.

In one embodiment, the system includes a storage means configured to store the wireless service provider information, the topological information and the information on the wireless service providers at the respective locations along the route. The information stored in the storage means may be described by an ontology. This facilitates the

generation of the service combination by the generation means. The topological information may include map information.

In one embodiment, the generation means is configured to sort a plurality of service combinations according to a route criterion where more than one service combination is generated. This facilitates the generation of a service combination that is in line with user preferences.

In one embodiment, the ticketing means includes a software agent. The software agent may be configured to send reservation requests to the respective wireless service providers in the service combination. The software agent may be configured to return a fail status to the interface on detecting a request failure.

Generally, it will be understood that the ticket is generated in an electronic or software form. According to preferred embodiments, the ticket is a software-based access token containing the information required and subsequently to be provided by the mobile terminal in order for it to be given access to each of a plurality of wireless service providers along the intended route. This information may contain or relate to Service Set Identifiers (SSIDs), authentication methods, encryption protocols, session validity (i.e. for how long the mobile terminal is to be given access to the service providers, individually or in total), access privileges, etc. The software token may be downloaded to the mobile terminal or to another user device once the reservation is confirmed, and may only remain valid for a pre-agreed time-frame which may be a few hours for example, or one day, or more. Such a ticket need not require significant effort by an end user because it may be downloaded automatically and managed by means of a software application on the user device. Added security measures, such as the access token only being valid for a particular device, can also be enforced in this manner.

An alternative to sending the ticket to the mobile terminal or to another user device is for the ticket to be sent to an authentication server, or to the wireless service providers, or to one or more servers acting for the service providers, from where it can be used to verify a user's ID during an access request phase, for example.

From a second aspect, the invention provides a method for providing substantially continuous wireless access to a mobile terminal, the method comprising: receiving a request from the mobile terminal, the request specifying an origin and a destination of the mobile terminal; generating a service combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers

along the route; and generating a ticket for the route according to the service combination, the ticket giving the mobile terminal access privilege along the route.

In the second aspect, corresponding advantages are obtained as previously described in respect of the first aspect. Moreover, corresponding further features as described above in respect of the first aspect may also be employed.

From a third aspect, the present invention further provides a computer program or suite of programs so arranged such that when executed by a computer system it/they cause/s the system to perform the method according to the second aspect.

Additionally, from a fourth aspect the invention also provides a computer readable storage medium storing a computer program or at least one of suite of computer programs according to the third aspect. The computer readable storage medium may be any magnetic, optical, magneto-optical, solid-state, or other storage medium capable of being read by a computer.

Other aspects and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

Brief Description of the Drawings

The following detailed description of preferred embodiments of the invention will be better understood when read in conjunction with the appended drawings. The present invention is illustrated by way of example and is not limited by the accompanying figures, in which like references indicate similar elements.

Figure 1 is a schematic diagram of a system for providing substantially continuous wireless access to a mobile terminal in accordance with an embodiment of the present invention;

Figure 2 is a map of a geographical area onto which coverage areas of respective wireless service providers are mapped in accordance with an embodiment of the present invention; and

Figure 3 is a schematic flow diagram illustrating a method for providing substantially continuous wireless access to a mobile terminal in accordance with another embodiment of the present invention.

Detailed Description of the Preferred Embodiments

A system and method for providing substantially continuous wireless access to a mobile terminal are provided. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be understood, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well known process operations have not been described in detail in order not to unnecessarily obscure the present invention.

Referring now to Figure 1, a system 10 for providing substantially continuous wireless access to a mobile terminal 12 is shown. The system 10 includes an interface 14, generation means 16, ticketing means 18, mapping means 20, first synchronisation means 22, second synchronisation means 24 and storage means 26. The interface 14 is configured to receive a request from the mobile terminal 12, the request specifying an origin and a destination of the mobile terminal 12. The generation means 16 is configured to generate a service combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers 28 along the route. The ticketing means 18 is configured to generate a ticket for the route according to the service combination, the ticket giving the mobile terminal 12 access privilege along the route. The mapping means 20 is configured to map wireless service provider information to topological information to generate information on the wireless service providers 28 at respective locations along the route. The first synchronisation means 22 is configured to update the wireless service provider information, while the second synchronisation means 24 is configured to synchronise the topological information with a plurality of map providers 30. The storage means 26 is configured to store the wireless service provider information, the topological information and the information on the wireless service providers 28 at the respective locations along the route.

The system 10 functions as a service broker providing a mechanism for mobile Internet users to reserve access across multiple wireless service providers 28 while travelling from one location to another. The system 10 may be implemented on one or more computers, for example, on a server or a network of computers. Although a number of system modules are described in this embodiment, it should be understood that the invention is not limited by the architecture of the system 10. The modular components shown in Figure 1 and described herein are intended to illustrate aspects of the present invention and not to limit the present invention to any particular configuration.

The mobile terminal 12 may be any portable electronic device having wireless capability such as, for example, a mobile phone, a Personal Digital Assistant (PDA) or a laptop computer, or any other mobile electronic equipment with wireless capability.

The interface 14 acts as a service interface between the mobile terminal 12 and any other system that is interested in utilising the services provided by the system 10. In one embodiment, the interface 14 is implemented on a web server.

The generation means 16 functions as an analyser that reasons for one or more combinations of wireless service providers 28 that can provide a user with substantially continuous wireless access along a route and that fulfil the preferred service requirements of the user based on the information stored in the storage means 26. In particular, the information on the available wireless service providers 28 at the respective locations along the route stored in the storage means 26 is compiled and processed by the generation means 16 to generate one or more service combinations for the route. In an embodiment where more than one service combination is generated, the generation means 16 is configured to sort a plurality of service combinations according to one or more route criteria. For example, in a case where a least cost connection criterion is specified, the generation means 16 sorts the service combinations according to cost and forwards a cheaper service combination to the ticketing means 18 ahead of a more expensive service combination. In another embodiment where more than one service combination is generated, a selection is made and the selected service combination is forwarded to the ticketing means 18.

In the present embodiment, the ticketing means 18 includes a software agent that communicates with the wireless service providers 28. On receiving instructions to generate a ticket for the service combination, the software agent sends reservation requests to the respective wireless service providers 28 in the service combination. If during the reservation process, any reservation request to a wireless service provider 28 fails, all previous successful reservations generated for the service combination are released and the next most appropriate service combination is processed by the ticketing means 18. This is repeated until either all the reservation requests pertaining to a particular service combination are successful or there are no more service combinations to be processed. If all the reservation requests are successful, the ticket is generated and sent to the interface 14 to be communicated to the mobile terminal 12. The ticket contains all the necessary configurations and settings such as access identification (ID), security access information, access preferences, etc. for gaining access or connecting to the

wireless service providers 28 along the route listed in the service combination for which the ticket was generated. In one embodiment, a fail status is returned to the interface 14 for communication to the mobile terminal 12 when the software agent detects a request failure and there are not more service combinations to be processed. The access privilege conferred by the ticket may be valid for days, weeks or months, allowing for reuse of the ticket by mobile users who travel along the same routes everyday.

The mapping means 20 maps coverage and access information from the participating wireless service providers 28 onto geographical maps. The result of a mapping operation performed by the mapping means 20 is shown in Figure 2 described below.

Referring now to Figure 2, a map 40 of a geographical area 42 onto which coverage areas 44 (defined by dashed lines) of respective wireless service providers WISPs are mapped is shown. The map 40 shown in Figure 2 is generated by mapping coverage information of the wireless service providers WISPs to topological information on the geographical area 42. The available wireless service providers WISPs at various locations within the geographical area 42 can be determined from the map 40.

Referring again to Figure 1, the first synchronisation means 22 updates the wireless service provider information by synchronising the wireless service provider information stored in the storage means 26 with services and coverage information from different subscribing service providers 28. This allows the first synchronisation means 22 to capture information such as, for example, the removal of an access point (AP), the upgrading of an AP, the temporary shutdown of an AP, the introduction of a new AP and a change in the location of an AP. In one embodiment, the first synchronisation means 22 is configured to update the wireless service provider information on receiving a wireless service provider synchronisation request from one of the wireless service providers 28. More particularly, the first synchronisation means 22 listens for wireless service provider synchronisation requests from respective ones of the wireless service providers 28. On receiving a wireless service provider synchronisation request, the first synchronisation means 22 saves the wireless service provider details provided with the wireless service provider synchronisation request in the storage means 26. Additionally, the first synchronisation means 22 may check whether the mapping means 20 requires notification of the update. If notification is required, the mapping means 20 is notified of the update by the first synchronisation means 22. The second synchronisation means 24 synchronises the topological information stored in the storage means 26 with map information from

other subscribed map providers 30. In one embodiment, the second synchronisation means 24 is configured to synchronise the topological information with the map providers 30 on receiving a map provider synchronisation request from one of the map providers 30. More particularly, the second synchronisation means 24 listens for map provider synchronisation requests from respective ones of the map providers 30. On receiving a map provider synchronisation request, the second synchronisation means 24 saves the map provider details provided with the map provider synchronisation request in the storage means 26. Additionally, the second synchronisation means 24 may check whether the mapping means 20 requires notification of the synchronisation. If notification is required, the mapping means 20 is notified of the synchronisation by the second synchronisation means 24. By updating the wireless service provider information and synchronising the topological information with the map providers 30, an accurate and up to date collection of information is maintained in the storage means 26. This ensures that the service combinations generated by the generation means 16 are current.

The storage means 26 functions as a central storage means for storing information on road topology and the wireless service providers 28. The wireless service provider information stored in the storage means 26 includes wireless service provider locations, coverage information and access information, while the topological information stored therein includes map information such as, for example, digitised maps of various locales. In one embodiment, the information on the wireless service providers 28 at the respective locations along the route includes coverage area mappings of the respective wireless service providers 28 with street grids. In the present embodiment, the information stored in the storage means 26 is described by an ontology, the ontology providing a specification of controlled vocabulary that describes the information stored in the storage means 26 and the relations between them in a formal way. The specification allows the use of the vocabulary in making queries and assertions related to the available wireless service providers 28 for a selected route. Nonetheless, it should be understood by those of skill in the art that the present invention is not limited to storage of information in an ontological format.

Having described the various system modules in an embodiment of the present invention, the operation of these modules will now be described in greater detail below with reference to Figures 1 and 3.

Figure 3 is a schematic flow diagram illustrating a method 50 for providing substantially continuous wireless access to a mobile terminal 12. In a first step 52, the

interface 14 receives a request from the mobile terminal 12, the request specifying an origin and a destination of the mobile terminal 12. The request may include one or more route criteria such as, for example, the cheapest connection, an average bandwidth, a minimum level of service performance, a minimum reliability rating, etc. The request may be submitted by a user of the mobile terminal 12 via an online direction or navigation guide system. The online direction guide is a route planning and map display software product for mobile terminals. Such systems are a popular means of navigation and are particularly useful for navigating around new places. Examples of such navigation systems include Google Maps and Yahoo! Maps. In one embodiment, the user uses a route navigation function of the online direction guide to select a route (e.g. the shortest or quickest route) between the origin and the destination.

On receiving the request, the generation means 16 generates at step 54 a service combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers 28 along the route. More particularly, the generation means 16 compiles and processes information on the wireless service providers 28 at respective locations along the route to generate the service combination for the route at step 54. This information is generated by the mapping means 20 on mapping wireless service provider information to topological information. In the present embodiment, the wireless service provider information is synchronised with the wireless service providers 28 by the first synchronisation means 22, while the topological information is synchronised with a plurality of map providers 30 by the second synchronisation means 24. The wireless service provider information is synchronised with the wireless service providers 28 at a predetermined interval, while the topological information is synchronised with the map providers 30 in a predetermined time frame. The wireless service provider information, the topological information and the information on the wireless service providers 28 at the respective locations along the route are stored in the storage means 26. In the present embodiment, the information stored in the storage means is described by an ontology and the topological information stored in the storage means includes map information.

In one embodiment where more than one service combination is generated at step 54, the generation means 16 sorts at step 56 a plurality of service combinations according to one or more route criteria specified in the request. In another embodiment, a selection is made at step 58 by the user from the more than one service combination generated at step 54. The selection may be made by the user at step 58 via the interface 14 based on one or more recommendations (e.g. the cheapest available connection, minimum

bandwidth required, service performance, reliability rating, etc.) made by the generation means 16, the one or more recommendations being based on the generated service combinations.

In the present embodiment, a ticket giving the mobile terminal 12 access privilege along the route is generated by a software agent. The access privilege reservation process involves sending reservation requests from the software agent to the respective wireless service providers 28 in the service combination. If it is determined at step 60 that all the reservation requests are successful, the ticket is generated at step 62 and sent to the interface 14 to be communicated to the mobile terminal 12. Where a request failure is detected at step 60, all previous successful reservations generated for the service combination are released and the next most appropriate service combination is processed by the ticketing means 18. However, if there are no more service combinations to be processed (i.e. $N = 0$), a fail status is returned to the interface 14 at step 64 for communication to the mobile terminal 12 on detection of a request failure by the software agent.

The method 50 for providing substantially continuous wireless access to the mobile terminal 12 may be run on a data processing device or a similar hardware device specifically built for the process. Generally, a device such as a personal computer or a midrange data processing device may be used. Such devices generally include a processing unit for running a program which implements the method 50, main memory for storing the program, and a mass storage device for storing the data collection or an interface to a network of networked computers on which the data collection is stored.

As is evident from the foregoing discussion, the present invention provides a system and method for providing substantially continuous wireless access to a mobile terminal traversing across a geographical area serviced by diverse wireless service providers. Advantageously, the present invention allows a mobile user to move between coverage areas of different wireless service providers along a route without having to manually reconnect or logon again. Additionally, the present invention can be used to obtain substantially continuous wireless access along a route at the lowest possible aggregated cost. Moreover, because the ticket conferring wireless access can be made valid for days, weeks or months, the ticket can be reused by a mobile user who travels along the same route frequently. Further, by updating the wireless service provider information and synchronising the topological information with the map providers, an accurate and up to date collection of information is maintained in the storage means. This ensures that the

service combinations generated by the system and method of the present invention are current.

While the preferred embodiments of the invention have been illustrated and described, it will be clear that the invention is not limited to these embodiments only. Numerous modifications, changes, variations, substitutions and equivalents will be apparent to those skilled in the art without departing from the spirit and scope of the invention as described in the claims.

Further, unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise", "comprising" and the like are to be construed in an inclusive as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

CLAIMS

1. A system (10) for providing substantially continuous wireless access to a mobile terminal (12), the system (10) comprising:

an interface (14) configured to receive a request from the mobile terminal (12), the request specifying an origin and a destination of the mobile terminal (12);

generation means (16) configured to generate a service combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers (28) along the route; and

ticketing means (18) configured to generate a ticket for the route according to the service combination, the ticket giving the mobile terminal (12) access privilege along the route.

2. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 1, further comprising mapping means (20) configured to map wireless service provider information to topological information to generate information on the wireless service providers (28) at respective locations along the route.

3. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 2, wherein the generation means (16) is configured to compile the information on the wireless service providers (28) at the respective locations along the route to generate the service combination for the route.

4. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 2 or 3, further comprising first synchronisation means (22) configured to update the wireless service provider information.

5. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 4, wherein the first synchronisation means (22) is configured to update the wireless service provider information on receiving a wireless service provider synchronisation request from one of the wireless service providers (28).

6. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to any one of claims 2 to 5, further comprising second

synchronisation means (24) configured to synchronise the topological information with a plurality of map providers (30).

7. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 6, wherein the second synchronisation means (24) is configured to synchronise the topological information with the map providers (30) on receiving a map provider synchronisation request from one of the map providers (30).

8. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to any one claims 2 to 7, further comprising a storage means (26) configured to store the wireless service provider information, the topological information and the information on the wireless service providers (28) at the respective locations along the route.

9. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 8, wherein the storage means (26) is configured to store the wireless service provider information, the topological information and the information on the wireless service providers (28) at the respective locations along the route, the information stored in the storage means (26) being described by an ontology.

10. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 8 or 9, wherein the storage means (26) is configured to store the topological information, the topological information including map information.

11. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to any one of the preceding claims, wherein the generation means (16) is configured to sort a plurality of service combinations according to a route criterion where more than one service combination is generated.

12. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to any one of the preceding claims, wherein the ticketing means (18) comprises a software agent.

13. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 12, wherein the software agent is configured to

send reservation requests to the respective wireless service providers (28) in the service combination.

14. The system (10) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 12 or 13, wherein the software agent is configured to return a fail status to the interface (14) on detecting a request failure.

15. A method (50) for providing substantially continuous wireless access to a mobile terminal (12), the method (50) comprising:

receiving (52) a request from the mobile terminal (12), the request specifying an origin and a destination of the mobile terminal (12);

generating (54) a service combination for a route between the origin and the destination, the service combination specifying a plurality of wireless service providers (28) along the route; and

generating (62) a ticket for the route according to the service combination, the ticket giving the mobile terminal (12) access privilege along the route.

16. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 15, further comprising mapping wireless service provider information to topological information to generate information on the wireless service providers (28) at respective locations along the route.

17. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 16, wherein the step of generating (54) the service combination for the route further comprises compiling the information on the wireless service providers (28) at the respective locations along the route.

18. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 16 or 17, further comprising updating the wireless service provider information.

19. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 18, wherein the wireless service provider information is updated on receiving a wireless service provider synchronisation request from one of the wireless service providers (28).

20. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to any one of claims 16 to 19, further comprising synchronising the topological information with a plurality of map providers (30).

21. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 20, wherein the topological information is synchronised with the map providers (30) on receiving a map provider synchronisation request from one of the map providers (30).

22. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to any one claims 16 to 21, wherein the wireless service provider information, the topological information and the information on the wireless service providers (28) at the respective locations along the route are stored in a storage means (26).

23. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 22, wherein the information stored in the storage means (26) is described by an ontology.

24. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 22 or 23, wherein the topological information stored in the storage means (26) includes map information.

25. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to any one of claims 15 to 24, wherein the step of generating the service combination (54) for the route further comprises sorting (56) a plurality of service combinations according to a route criterion where more than one service combination is generated.

26. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to any one of claims 15 to 25, wherein the ticket for the route is generated (62) by a software agent.

27. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 26, wherein the step of generating (62) the ticket

for the route further comprises sending reservation requests from the software agent to the respective wireless service providers (28) in the service combination.

28. The method (50) for providing substantially continuous wireless access to a mobile terminal (12) according to claim 26 or 27, further comprising returning (64) a fail status on detection of a request failure by the software agent.

29. A computer program or suite of computer programs executable by a computer system to cause the computer system to perform the method (50) of any one of claims 15 to 28.

30. A computer readable storage medium storing a computer program or any one or more of a suite of computer programs according to claim 29.

Fig.1.

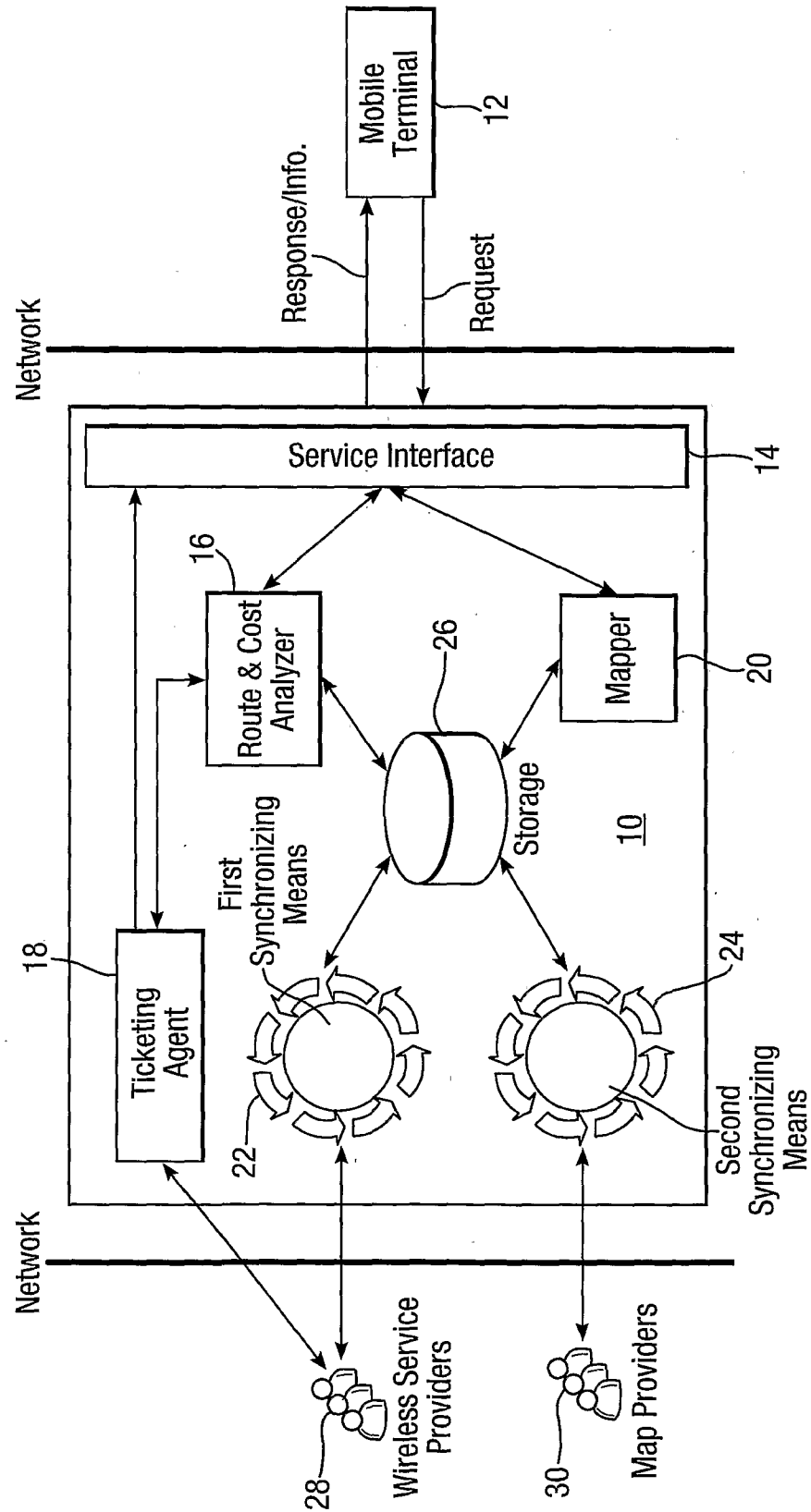


Fig. 2.

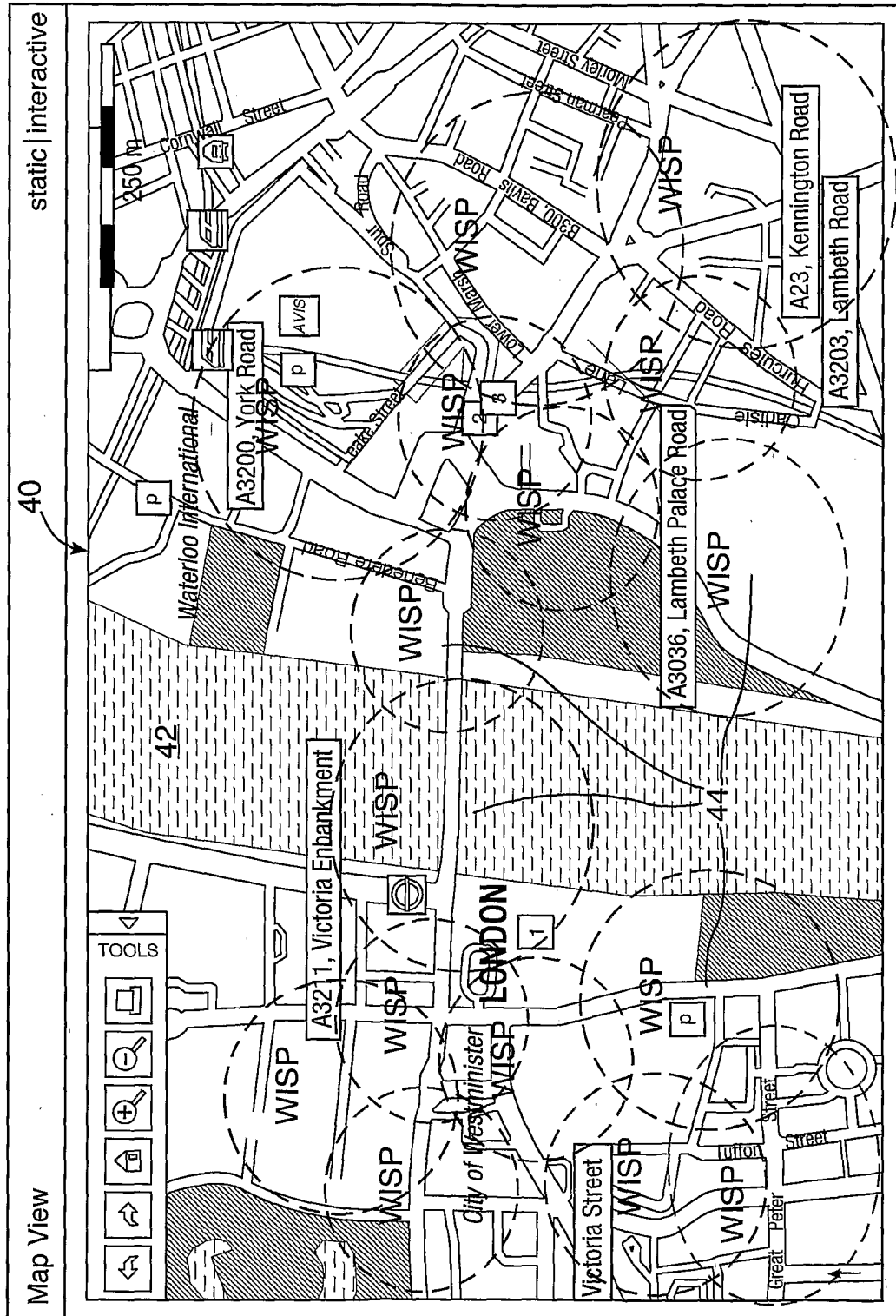
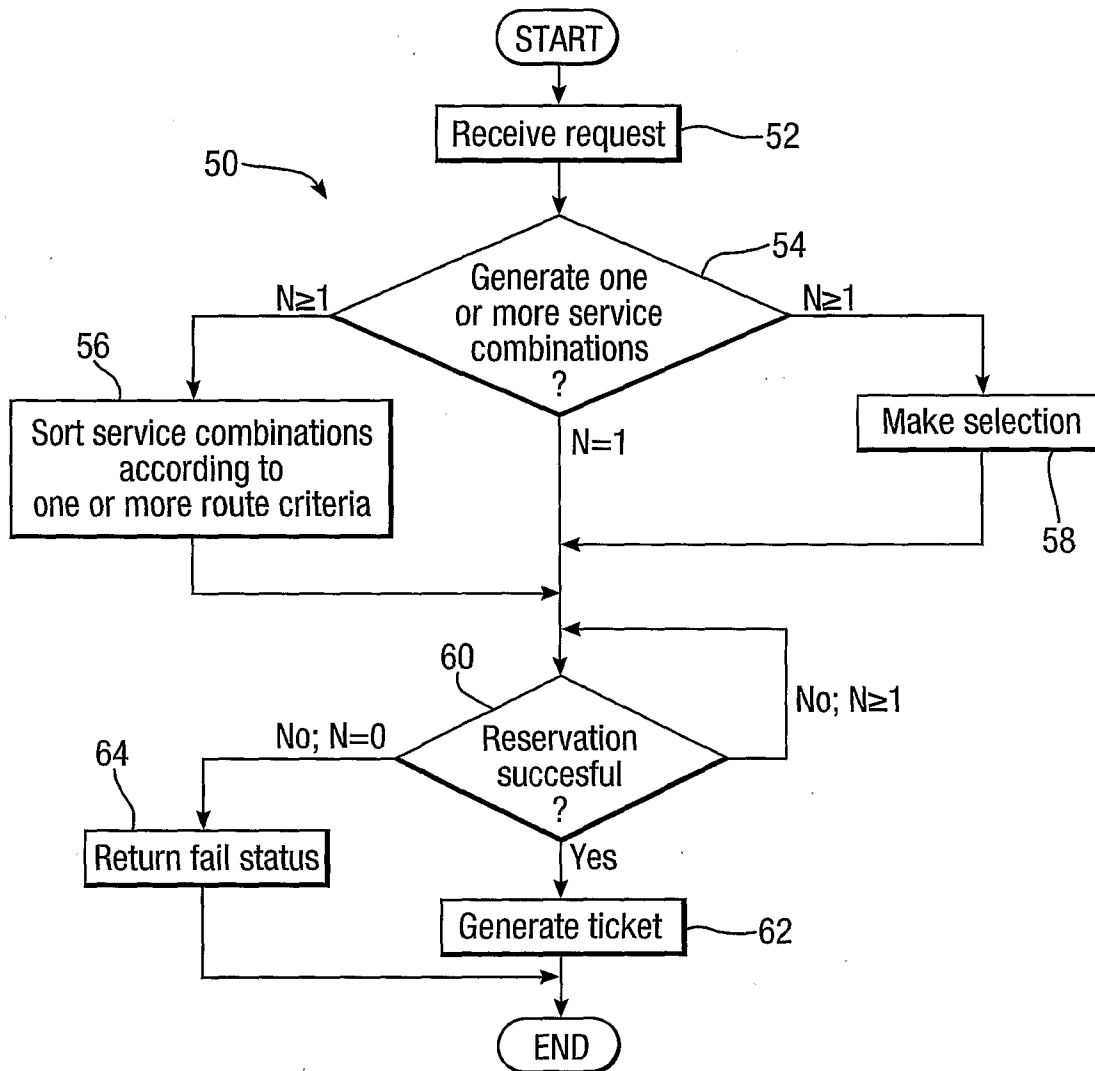


Fig.3.



INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2007/002878

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04Q7/38 H04L12/28 H04L12/56

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)

H04L H04Q

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

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

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/067643 A (ERICSSON TELEFON AB L M [SE]; RYDNELL GUNNAR [SE]; LINDSKOG JAN [SE];) 29 June 2006 (2006-06-29) page 3, line 25 - page 8, line 5	1-30
X	EP 1 191 741 A (PIONEER CORP [JP]) 27 March 2002 (2002-03-27) column 5, paragraph 13 - column 8, paragraph 34 column 9, paragraph 39 - column 12, paragraph 60 column 14, paragraph 69 - column 15, paragraph 70 column 20, paragraph 96 - column 23, paragraph 110 ----- -/--	1-30

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the International search

21 November 2007

Date of mailing of the International search report

30/11/2007

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INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2007/002878

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	EUN KYOUNG PAIK ET AL: "Prediction-based fast handoff for mobile WLANs" TELECOMMUNICATIONS, 2003. ICT 2003. 10TH INTERNATIONAL CONFERENCE ON FEB. 23 - MAR. 1, 2003, PISCATAWAY, NJ, USA, IEEE, vol. 1, 23 February 2003 (2003-02-23), pages 748-753, XP010637896 ISBN: 0-7803-7661-7 the whole document -----	1-30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2007/002878

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