(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(54) Title: SYSTEM AND METHOD TO PROVIDE LOCATION DATA VIA A COMMUNICATIONS NETWORK
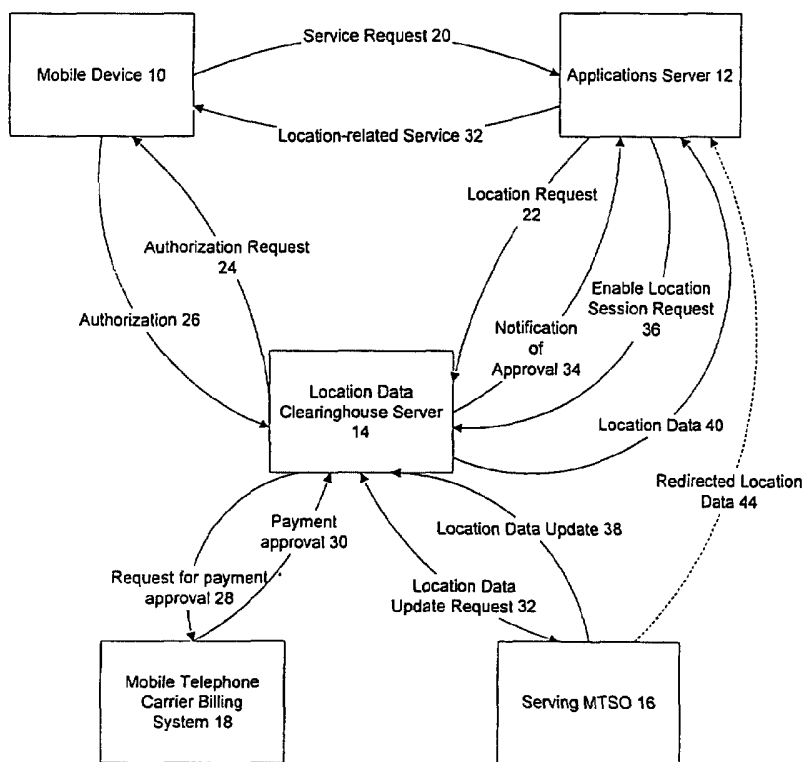
(57) Abstract: A computer method for providing the location of a mobile device to an applications server. The method comprising receiving a request for the location of the mobile device from the applications server that identifies the mobile device and the carrier providing mobile telephone service to the mobile device. The identifying data is then used to determine the mobile telephone switching office currently serving the mobile device. If the mobile device subscriber has not provided pre-authorization for providing the location of the mobile device to the applications server, authorization is requested from the mobile device to provide the location of the mobile device to the applications server and to incur the cost or obtain the benefit of so doing on behalf of the mobile device subscriber. Upon receiving authorization from the mobile device to provide data respecting the location of the mobile device to the applications server or, if the mobile device subscriber has pre-authorized the providing of the location of the mobile device to the applications server, payment approval is requested from the carrier providing mobile telephone service to the mobile device of any cost to mobile device subscriber of providing the location of the mobile device to the applications server.

ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report*

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System and Method to Provide
Location Data via a Communications Network

Field of the Invention

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The present invention relates to the distribution of mobile device location data via a communications network, and in particular, to the billing and validation of such requests for such data via the communications network.

10   ### Background of the Invention

It has recently become technically possible for data providing the location of mobile devices to be determined by mobile telephone carriers. However, there is a need for a system for distributing such data to the providers of services to mobile device users and others in a manner

15   that is efficient, secure, and protects the privacy of the users of mobile devices.

Summary of the Invention

In one aspect the invention provides a computer method for providing the location of a

20   mobile device to an applications server. The method includes receiving a request for the location of the mobile device from the applications server. The request includes data that identifies the mobile device and the carrier providing mobile telephone service to the mobile device. The identifying data is then used to determine the mobile telephone switching office currently serving the mobile device. The cost for, or benefit to, the account of the mobile device subscriber for

25   providing the location of the mobile device to the applications server is determined. If the mobile device subscriber has not provided pre-authorization for providing the location of the mobile device to the applications server, authorization is requested from the mobile device to provide the location of the mobile device to the applications server and to incur the cost or obtain the benefit of so doing on behalf of the mobile device subscriber. Upon receiving authorization from the mobile

30   device to provide data respecting the location of the mobile device to the applications server or, if the mobile device subscriber has pre-authorized the providing of the location of the mobile device

to the applications server, payment approval is requested from the carrier providing mobile telephone service to the mobile device of any cost to the mobile device subscriber of providing the location of the mobile device to the applications server. Upon receiving payment approval from the carrier for any cost to the mobile device subscriber of providing the location of the mobile

5   device to the applications server, the current location of the mobile device is obtained from the mobile telephone switching office currently serving the mobile device and is sent to the applications server. Alternatively, upon receiving payment approval from the carrier for any cost to the mobile device subscriber of providing the location of the mobile device to the applications server, a request is sent to the mobile telephone switching office currently serving the mobile

10   device to send the current location of the mobile device to the applications server.

Brief Description of the Drawings

Figure 1 is a block diagram illustrating the flow of data in a location data distribution

15   system that is a first embodiment of the present invention.

Figure 2 is a block diagram illustrating the flow of data in a location data distribution system that is a second embodiment of the present invention.

20   Figure 3 is a flowchart describing the processing of location data in the location data clearinghouse server of Figure 1.

Figure 4 is a flowchart describing the processing of location data in the location data clearinghouse server of Figure 2.

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Detailed Description

The overall flow of data in a first embodiment of a location data distribution system embodying the present invention is illustrated in Figure 1. A user of a mobile device 10 has

30   decided to request a location-based service from an applications server 12. In the following discussion, the user operating the mobile device 10 will be referred to as simply "the mobile device

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10". The location data distribution system provides a location data clearinghouse server 14, which interacts with the mobile device 10 and the applications server 12 to fulfill the request of the mobile device 10. The location data clearinghouse server 14 also provides billing information to a mobile carrier billing system 18 and obtains location data from a serving mobile telephone

5   switching office ("an MTSO") 16.

More specifically, the mobile device 10 sends a service request 20 to the applications server 12 via a mobile telephone network (not shown explicitly in the drawings) that operates MTSO 16. It is assumed that the applications server 12 needs the location of the mobile device 10 in order to

10   provide the requested service. For example, the requested service may be to provide to the mobile device 10 a list of addresses of restaurants near the present location of the mobile device 10.

The applications server 12, upon receiving a service request 20 from the mobile device 10 that requires location data, in turn sends a location request 22 to the location data clearinghouse

15   server 14 via a communications link. The location request 22 includes data identifying the mobile device 10 and may include other data identifying the requested service. The location request 22 may also include a price to be charged for the requested service.

The location data clearinghouse server 14 may maintain a database (not shown in Figure 1)

20   for maintaining preferences that the mobile device 10 may have regarding disclosure of data respecting the location of the mobile device 10. The preference data maintained in the database is discussed further below. Such data may be obtained when a subscription with the mobile telephone network is set up for the mobile device 10 and may be modified later by a user of the mobile device 10.

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Unless the database maintained by the location data clearinghouse server 14 indicates that the mobile device 10 has pre-authorized the providing of data respecting the location of the mobile device 10 to the applications server 12, the location data clearinghouse server 14 upon receipt of the location request 22, sends an authorization request 24 to the mobile device 10 via the mobile

30   telephone network requesting authorization from the mobile device 10 to provide data respecting

the location of the mobile device 10 to the applications server 12 and to incur the cost or obtain the benefit of so doing on behalf of the mobile device 10.

If the mobile device 10 responds to the authorization request 24 with an authorization 26 or,
according to the database maintained by the location data clearinghouse server 14, has pre-authorized the location data clearinghouse server 14 to provide data respecting the location of the mobile device 10 to the applications server 12, the location data clearinghouse server 14 determines who is to bear the cost of providing data respecting the location of the mobile device 10 to the applications server 12. In some cases the cost may be born by the operator of the application server 12 or a third party rather than by the mobile device 10. For example, in the case mentioned above, the mobile device 10 has requested the address of nearby restaurants. The cost of providing the mobile device's location to the applications server 12 might in that case be paid by the restaurants whose addresses are provided to the mobile device 10. In fact, in some cases, the mobile device 10 might receive a benefit for allowing his or her location to be provided to the application server 12 so that merchants near to the mobile device's current location could send advertising to the mobile device 10. In the following discussion, it will be assumed that the cost of providing data respecting the location of the mobile device 10 to the applications server 12 is charged to the account of the mobile device 10 that is maintained by the mobile device carrier. However, it is within the scope of the invention for the cost of providing data respecting the location of the mobile device 10 to the applications server 12 to be paid by someone else. Hence wherever a cost is referred to below, the possibility the cost could be negative or zero should be kept in mind. Hence the location data clearinghouse server 14 determines an allocation of the cost of providing data respecting the location of the mobile device 10 to the applications server 12.

If the location data clearinghouse server 14 determines that the mobile device 10 is to pay part or all of the cost of providing data respecting the location of the mobile device 10 to the applications server 12, the location data clearinghouse server 14 sends a request for payment approval 28 to the mobile device carrier billing system 18. If payment approval 30 is obtained, the mobile device carrier billing system 18 bills the cost to the mobile device 10.

If the location data clearinghouse server 14 receives payment approval 30 from the mobile telephone carrier billing system 18, a location data update request 32 is to the serving MTSO 16 and notification of approval 34 is sent to the applications server 12. The applications server 12 then sends an enable location session request 36 to the location data clearinghouse server 14.

5   Contemporaneously, the serving MTSO 16 sends a location data update 38 to the location data clearinghouse server 14, which in turn sends a location data 40 to the applications server 12.

Alternatively, data respecting the location of the mobile device 10 may be sent directly from the serving MTSO 16 to the applications server 12 in response to the location data update

10   request 32 as redirected location data 44.

In a second embodiment shown in Figure 2, a third party device 11 requests a service requiring the location of the mobile device 10. The flow of data is the same as that described in relation to Figure 1, with the exception that the service request 20 is made by the third party device

15   11 rather than the mobile device 10 and the location-based service 32 is provide by the applications server 12 to the third party device 11. Further, the cost of providing the location data may be for the account of a subscriber to the mobile telephone network responsible for the payment of charges with respect to the third party device 11. The third party device 11 may be a mobile device, but may also be a computer connected to the Internet. .

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Figures 3 and 4 provide a detailed description of a sequence of operations that may be used to implement the embodiments of the inventions shown in Figures 1 and 2, respectively, in the location data clearinghouse server 14. It has been assumed for the purposes of Figures 2 and 4 that the person responsible for charges incurred by the operation of the third party device 11 in

25   obtaining the location-related service 32 is a subscriber to the mobile telephone carrier system if the cost of providing the location of the mobile device 10 to the applications server 12 is not to be for the account of the subscriber responsible for charges incurred by the mobile device 10. While not illustrated in Figure 4, it is within the scope of the invention for the operator of the applications server 12 or someone else other than the person responsible for the third party device 11 to be a

30   subscriber to the mobile telephone network and be responsible for the cost of providing the location of the mobile device 10 to the applications server 12.

The system for distribution of costs and benefits incurred in providing the location of the mobile device 10 to the applications server 12 is outside the scope of the present invention. Such costs and benefits may be collected through the carrier's billing system and distributed among the operators of the applications server 12, the MTSO 16, the location data clearinghouse server 14, the carrier, and others.

What is claimed is:

1.   A computer method for providing the location of a mobile device to an applications server, the method comprising:

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receiving a request for the location of the mobile device from the applications server, the request identifying the mobile device and the carrier providing mobile telephone service to the mobile device;

10   using the identifying data to determine the mobile telephone switching office currently serving the mobile device;

requesting authorization from the mobile device to provide the location of the mobile device to the applications server;

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upon receiving authorization from the mobile device to provide data respecting the location of the mobile device to the applications server, obtaining the current location of the mobile device from the mobile telephone switching office currently serving the mobile device and sending the current location of the mobile device to the applications server.

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2.   A computer method for providing the location of a mobile device to an applications server, the method comprising:

receiving a request for the location of the mobile device from the applications server, the request

25   identifying the mobile device and the carrier providing mobile telephone service to the mobile device;

using the identifying data to determine the mobile telephone switching office currently serving the mobile device;

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requesting authorization from the mobile device to provide the location of the mobile device to the applications server;

upon receiving authorization from the mobile device to provide data respecting the location of the

5   mobile device to the applications server, sending a request to the mobile telephone switching office currently serving the mobile device to send the current location of the mobile device to the applications server.

3.   A computer method for providing the location of a mobile device to an applications server,

10   the method comprising:

receiving a request for the location of the mobile device from the applications server, the request identifying the mobile device and the carrier providing mobile telephone service to the mobile device;

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using the identifying data to determine the mobile telephone switching office currently serving the mobile device;

requesting authorization from the mobile device to provide the location of the mobile device to the

20   applications server;

upon receiving authorization from the mobile device to provide data respecting the location of the mobile device to the applications server, requesting payment approval from the carrier providing mobile telephone service to the mobile device of the cost to the mobile device subscriber of

25   providing the location of the mobile device to the applications server;

upon receiving payment approval from the carrier for the cost to the mobile device subscriber of providing the location of the mobile device to the applications server, obtaining the current location of the mobile device from the mobile telephone switching office currently serving the mobile

30   device; and

upon obtaining the current location of the mobile device from the mobile telephone switching office currently serving the mobile device, sending the current location of the mobile device to the applications server.

5   4.   A computer method for providing the location of a mobile device to an applications server, the method comprising:

receiving a request for the location of the mobile device from the applications server, the request identifying the mobile device and the carrier providing mobile telephone service to the mobile

10   device;

using the identifying data to determine the mobile telephone switching office currently serving the mobile device;

15   requesting authorization from the mobile device to provide the location of the mobile device to the applications server;

upon receiving authorization from the mobile device to provide data respecting the location of the mobile device to the applications server, requesting payment approval from the carrier providing

20   mobile telephone service to the mobile device of the cost to the mobile device subscriber of providing the location of the mobile device to the applications server; and

upon receiving payment approval from the carrier for the cost to the mobile device subscriber of providing the location of the mobile device to the applications server, sending a request to the

25   mobile telephone switching office currently serving the mobile device to send the current location of the mobile device to the applications server.

5.   A computer method for providing the location of a mobile device to an applications server, the method comprising:

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receiving a request for the location of the mobile device from the applications server, the request identifying the mobile device and the carrier providing mobile telephone service to the mobile device;

5 using the identifying data to determine the mobile telephone switching office currently serving the mobile device;

determining a cost for or benefit to the account of the mobile device subscriber for providing the location of the mobile device to the applications server;

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if the mobile device subscriber has not provided pre-authorization for providing the location of the mobile device to the applications server, requesting authorization from the mobile device to provide the location of the mobile device to the applications server and to incur the cost or obtain the benefit of so doing on behalf of the mobile device subscriber;

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upon receiving authorization from the mobile device to provide data respecting the location of the mobile device to the applications server or, if the mobile device subscriber has pre-authorized the providing of the location of the mobile device to the applications server, requesting payment approval from the carrier providing mobile telephone service to the mobile device of any cost to the

20 mobile device subscriber of providing the location of the mobile device to the applications server;

upon receiving payment approval from the carrier for any cost to the mobile device subscriber of providing the location of the mobile device to the applications server, obtaining the current location of the mobile device from the mobile telephone switching office currently serving the mobile

25 device; and

upon obtaining the current location of the mobile device from the mobile telephone switching office currently serving the mobile device, sending the current location of the mobile device to the applications server.

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6.   A computer method for providing the location of a mobile device to an applications server, the method comprising:

5   receiving a request for the location of the mobile device from the applications server, the request identifying the mobile device and the carrier providing mobile telephone service to the mobile device;

    using the identifying data to determine the mobile telephone switching office currently serving the mobile device;

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    determining a cost for or benefit to the account of the mobile device subscriber for providing the location of the mobile device to the applications server;

    if the mobile device subscriber has not provided pre-authorization for providing the location of the
15   mobile device to the applications server, requesting authorization from the mobile device to provide the location of the mobile device to the applications server and to incur the cost or obtain the benefit of so doing on behalf of the mobile device subscriber;

    upon receiving authorization from the mobile device to provide data respecting the location of the
20   mobile device to the applications server or, if the mobile device subscriber has pre-authorized the providing of the location of the mobile device to the applications server, requesting payment approval from the carrier providing mobile telephone service to the mobile device of any cost to the mobile device subscriber of providing the location of the mobile device to the applications server; and

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    upon receiving payment approval from the carrier for any cost to the mobile device subscriber of providing the location of the mobile device to the applications server, sending a request to the mobile telephone switching office currently serving the mobile device to send the current location of the mobile device to the applications server.
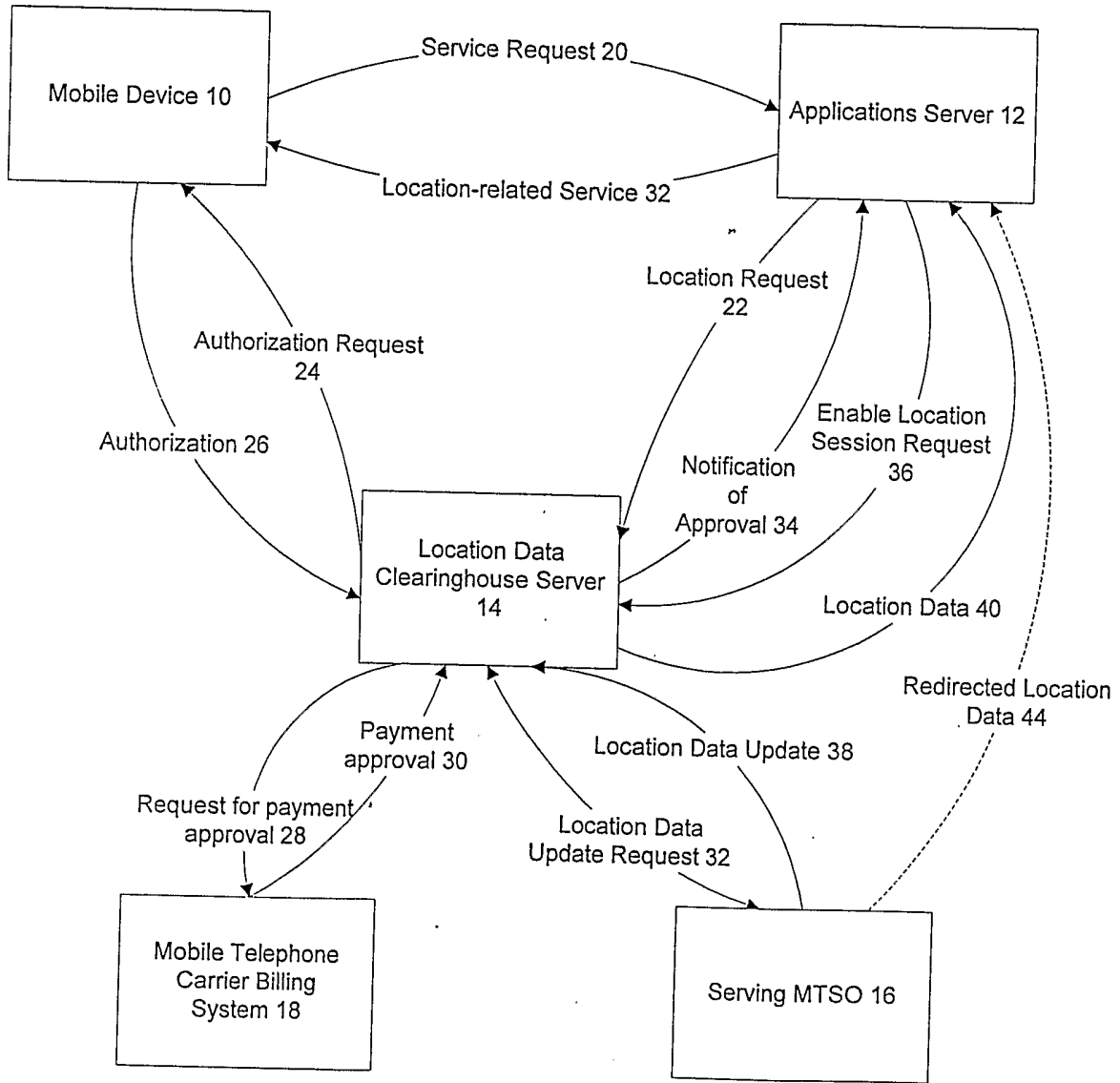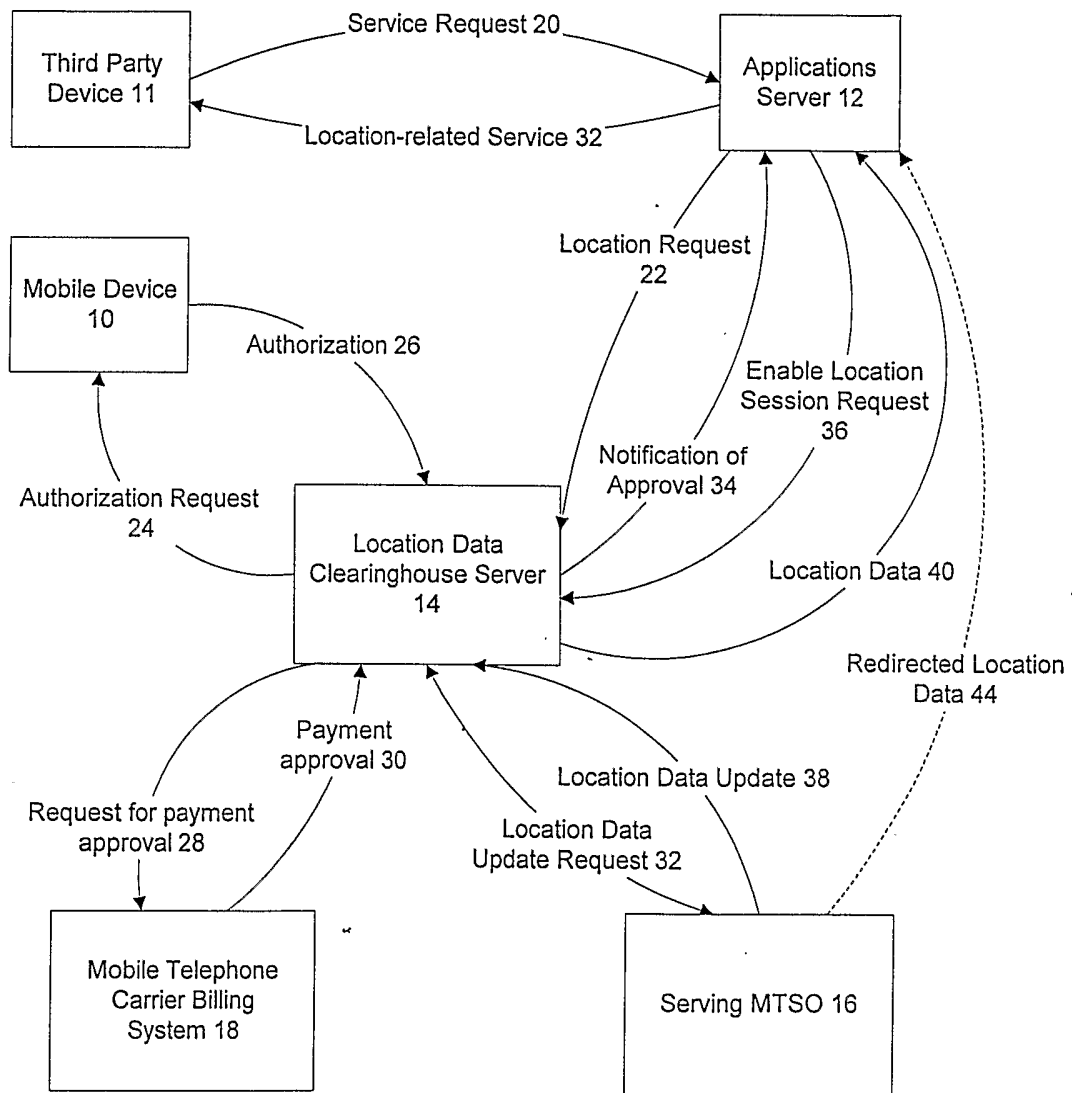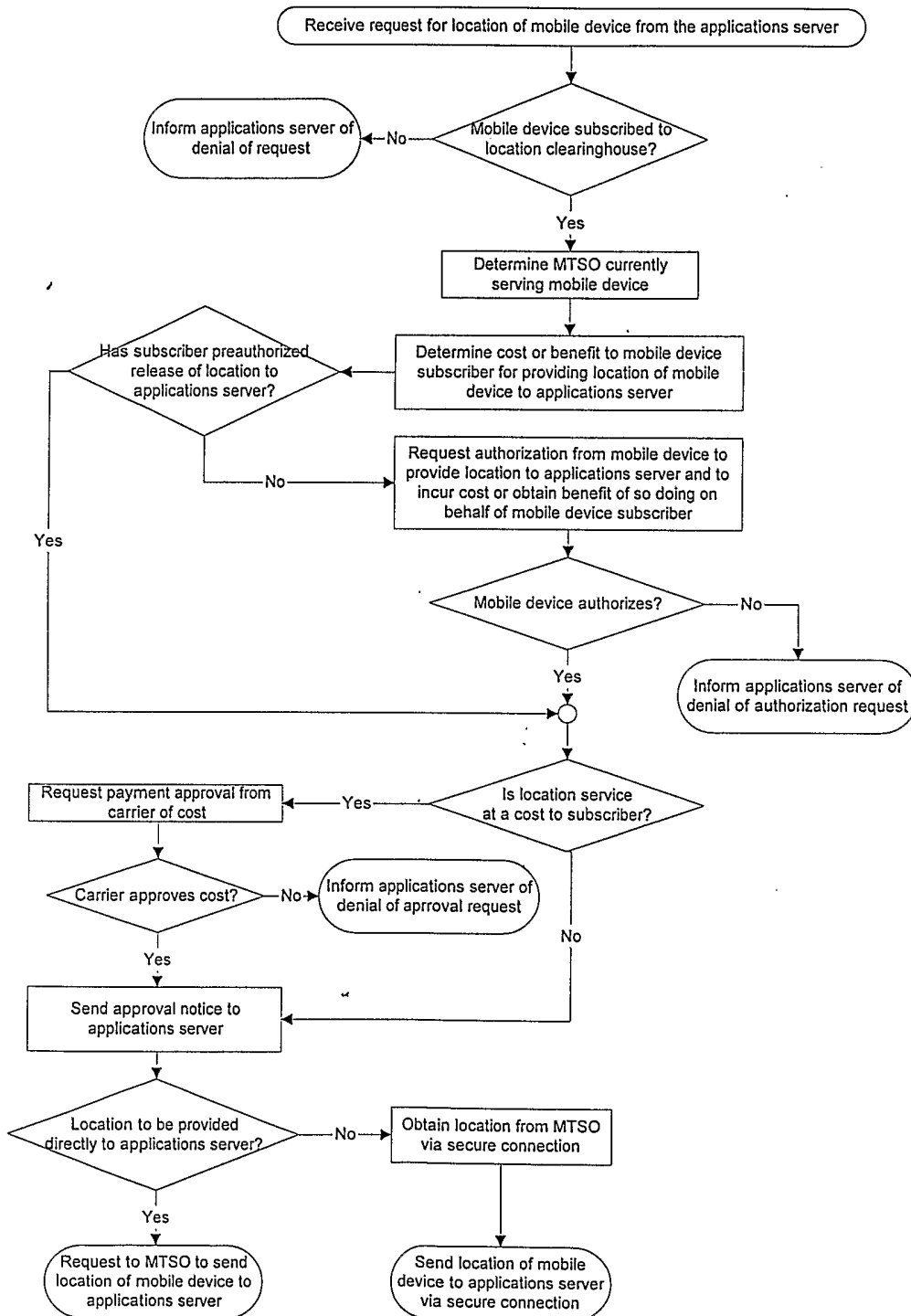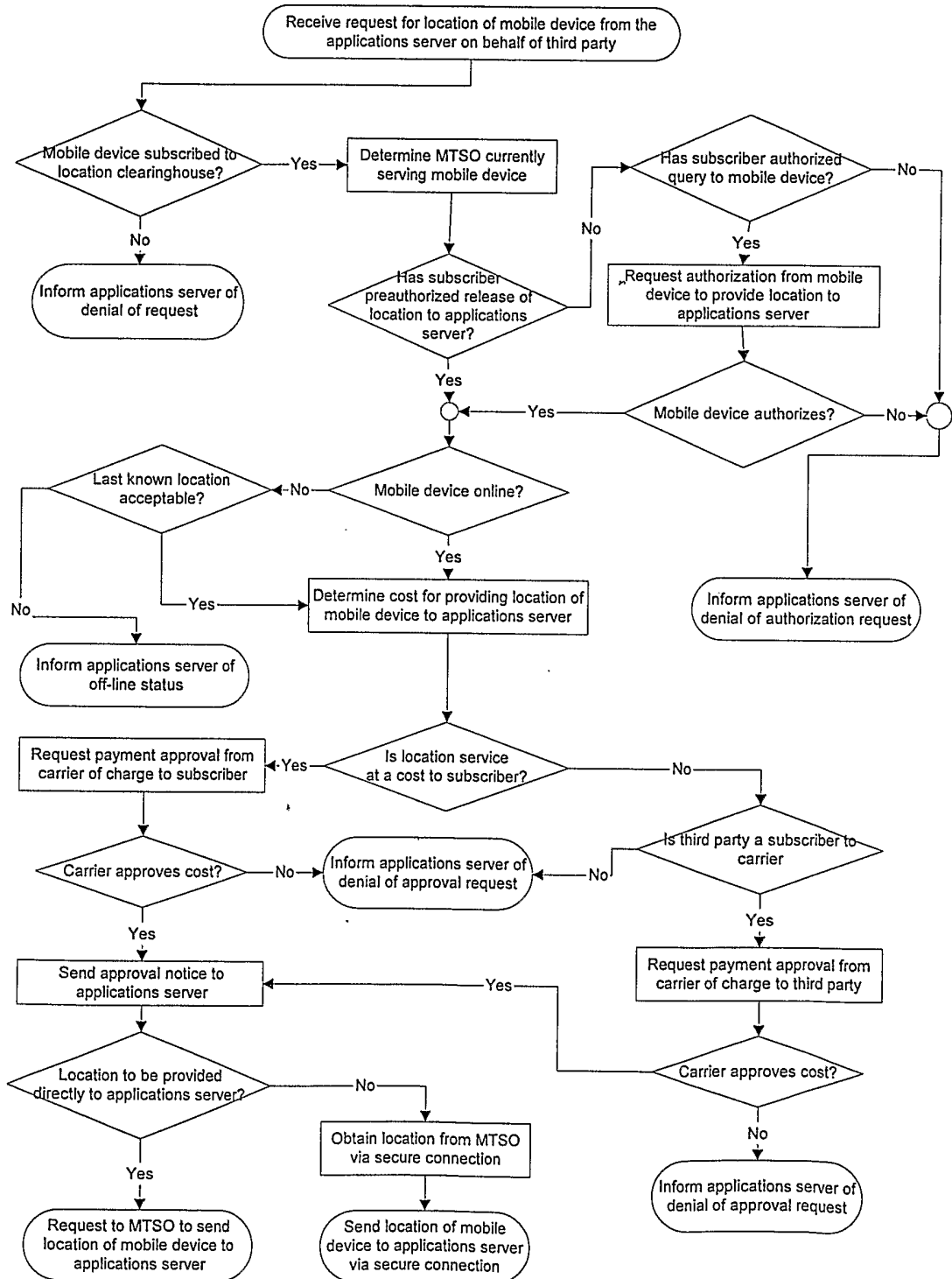
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Figure 1

Figure 2

Figure 3

Figure 4