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Method of Updating Client's Installed Data in Response to a User-triggered Event

ABSTRACT OF THE DISCLOSURE

5 A client terminal (10), such as a mobile terminal, stores a version number of its installed data or control program and transmits a request message to the server system (13) via a communication network (11) in response to an event triggered by a user of the client terminal (10), the request message containing the version number of the data and a phone number of the client terminal (10). The server system (13) stores most recent data and a version number of the most recent data. The server system (13) compares the version number contained in the received request to the stored version number and transmits a copy of the most recent data and the version number of the most recent data to the client terminal (10) if there is a mismatch between the compared version numbers. The client terminal (10) receives the copy of the most recent data and the version number and updates the installed data and version number.

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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

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Invention Title:

Method of Updating Client's Installed Data in Response
to a User-triggered Event

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

1 TITLE OF THE INVENTION

2 **Method of Updating Client's Installed Data in Response to**
3 **a User-Triggered Event**

4 BACKGROUND OF THE INVENTION

5 Field of the Invention

6 The present invention relates to a method of updating data such
7 as control programs, files and data modules.

8 Description of the Related Art

9 Recent advances in mobile communications and integrated
10 circuit technologies have made possible the proliferation of low-cost,
11 small mobile (client) terminals that are easy to communicate with an
12 increasing number of communication terminals and systems through
13 the mobile communication network or the Internet. An increasing
14 number of software packages (such control programs, associated file
15 data, and data modules) have been developed for installation on mobile
16 terminals in order to meet new customer services. However, whenever
17 users desire a new service feature, the assistance of trained personnel is
18 required to update their software packages.

19 Transmission of software data can be done in one of two known
20 methods. In the first method, called "pull technologies", users take the
21 initiative for retrieving data from sources such as World Wide Web. The
22 second method, called "push technologies", is one that is initiated by
23 news servers on the internet which take the initiative to distribute news
24 to users on a broadcast mode. These known methods may be used for
25 updating software installed on user terminals.

1 However, the pull technologies inherently require the initiative
2 on the client side, while the updating of software itself must be initiated
3 from the source where the software was created or modified. The push
4 technologies, on the other hand, require that file transfer be performed
5 on a broadcast mode. However, the burden of the network will increase
6 significantly if it were to carry traffic to a large number of user
7 terminals.

8 SUMMARY OF THE INVENTION

9 It is therefore an object of the present invention to provide an
10 efficient method of updating data installed on a client (mobile) terminal
11 when a user-triggered event occurs on the user's terminal.

12 According to a first aspect of the present invention, there is
13 provided a method of updating data installed on a client terminal from
14 a server system via a communication network. According to the present
15 invention, the client terminal, such as mobile terminal, stores a version
16 number of the installed data and transmits a request message to the
17 server system via the communication network in response to an event
18 triggered by a user of the client terminal, the request message containing
19 the version number of the data and a phone number of the client
20 terminal. The server system stores most recent data and a version
21 number of the most recent data. When the server system receives the
22 transmitted request, it compares the version number contained in the
23 received request to the stored version number and transmits a copy of
24 the most recent data and the version number of the most recent data to
25 the client terminal via the communication network if there is a
26 mismatch between the compared version numbers. The client terminal

1 receives the copy of the most recent data and the version number
2 from the server system and updates the installed data with the received
3 copy and updates the stored version number with the received version
4 number.

5 According to a second aspect of the present invention, the client
6 terminal transmits a request message to a server system via a
7 communication network in response to an event triggered by a user of
8 the client terminal, the request message containing a phone number of
9 the client terminal. The server system stores most recent data and
10 further stores a version number of the most recent data in a first
11 memory and maps a plurality of version numbers of the data to a
12 plurality of phone numbers in a second memory. The server system, on
13 receiving the request transmitted from the client terminal, compares a
14 version number mapped in the second memory corresponding to the
15 phone number contained in the received request to the version number
16 of the most recent data stored in the first memory. If there is a
17 mismatch between the compared version numbers, the server system
18 transmits a copy of the most recent data to the client terminal via the
19 communication network and updates the corresponding mapped
20 version number in the second memory with the version number of the
21 first memory. The client terminal receives the copy of the most recent
22 data from the server system and updates the installed data with the
23 received copy.

24 BRIEF DESCRIPTION OF THE DRAWINGS

25 The present invention will be described in further detail with
26 reference to the accompanying drawings, in which:

1 Fig. 1 is a block diagram of a mobile communication network
2 according to the present invention for updating mobile's file data
3 through a communication network;

4 Fig. 2 is a block diagram of the mobile terminal of Fig. 1;

5 Fig. 3 is a flowchart for operating the mobile terminal according
6 to a first embodiment of the present invention;

7 Fig. 4 is a block diagram of the home location register of Fig. 1;

8 Fig. 5 is a flowchart for operating the home location register
9 according to the first embodiment of the present invention;

10 Fig. 6 is a block diagram of the server of Fig. 1;

11 Figs. 7A and 7B are flowcharts for operating the server according
12 to the first embodiment of the present invention;

13 Fig. 8 is a sequence diagram for illustrating the overall operation
14 of the system according to the first embodiment of the present
15 invention;

16 Fig. 9 is a flowchart for operating the mobile terminal according
17 to a second embodiment of the present invention;

18 Fig. 10 is a block diagram of the home location register according
19 to the second embodiment of the present invention;

20 Fig. 11 is a flowchart for operating the home location register
21 according to the second embodiment of the present invention;

22 Fig. 12 is a flowchart for operating the server according to the
23 second embodiment of the present invention;

1 Fig. 13 is a sequence diagram for illustrating the overall operation
2 of the system according to the second embodiment of the present
3 invention;

4 Fig. 14 is a flowchart for operating the server for controlling the
5 network traffic when the network is likely to be overloaded with
6 updating file transfer; and

7 Fig. 15 is a flowchart for operating the home location register for
8 controlling the network traffic when the network is likely to be
9 overloaded with updating file transfer.

10 DETAILED DESCRIPTION

11 Referring now to Fig. 1, there is shown a mobile communication
12 system according to the present invention as one example of client-
13 server systems. The system includes a mobile communications network
14 11, a home location register 12, a server 13 and a network manager 14.
15 Mobile communication network 11 is made up of a large number of
16 wireless base stations each providing a coverage of a cell to serve a
17 mobile terminal 10. When the mobile terminal 10 enters one of the cells
18 or remains in one cell, a location registration request is sent from the
19 mobile terminal to the network. Home location register 12 is connected
20 to the network to receive the location registration request and provides
21 mapping of the mobile's address number to the address number of the
22 current base station.

23 As shown in Fig. 2, the mobile terminal includes a memory 20
24 such as flash memory or a random-access memory for storage of a
25 control program, associated files and software version numbers. A

1 control unit (CPU) 21 is connected to the memory 20 to perform signal
2 processing according to the control program of the memory 20. Mobile
3 terminal 10 is connected to a transceiver 22 to transmit and receive
4 control signals to and from the network via a wireless interface 23. A
5 speech circuit 24 is connected to the transceiver 22 and further to the
6 mobile terminal 10 to establish and maintain speech communication. A
7 keypad 25 and a display unit 26 are also connected to the mobile
8 terminal 10. Mobile terminal 10 has the functions of sending a location
9 registration request at the time the mobile terminal is powered on or a
10 call is initiated or terminated.

11 The operation of the mobile terminal 10 proceeds according to the
12 flowchart of Fig. 3.

13 When the mobile terminal is briefly in a state that occurs in
14 response to the power switch being turned on, a call-origination or a
15 call-termination key is operated on the keypad (block 101), the mobile
16 terminal 10 reads the version number of a specified file from the
17 memory 20 (block 102). Mobile terminal 10 transmits a location
18 registration request containing the retrieved version number and the
19 mobile's phone number to the network via the base station of the local
20 cell (block 103).

21 Mobile terminal 10 now enters a waiting state for a response from
22 the network. As will be described, the transmitted signal is passed
23 through the mobile communication network 11 to the home location
24 register 12 where the version number of the specified file is compared to
25 its most recent version number. If they mismatch, the home location

1 register 12 sends a download request to the server 13, which begins a file
2 transfer to download the file data of the most recent version to the
3 mobile terminal 10 through the network 11.

4 When the mobile terminal starts receiving the transmitted file
5 data (block 104), the mobile terminal 10 proceeds to block 105 to store
6 the received data in a new memory space reserved in the memory 20
7 and performs an error check on the received file data (block 106). If no
8 error is detected (block 107), the mobile terminal 10 moves the read
9 pointer to the new memory space and deletes the old file from the
10 memory 20 (block 108) and returns a positive acknowledgment message
11 to the server 13 via the network 11 (block 110). If an error is detected
12 (block 107), flow proceeds to block 110 to delete the new file data and
13 sends back a negative acknowledgment message to the server 13 (block
14 111) and returns to decision block 104 for receiving a retransmitted file.
15 and repeating an error check process on the retransmitted file data.

16 As shown in Fig. 4, the home location register 12 is connected to
17 the server 13 via a line receiver 30 and a line transmitter 31 and
18 connected to the network 11 via a line receiver 32 and a line transmitter
19 33. A controller 34 is connected to the line receiver 30 to receive a new
20 version number of the specified file from the server 13 and updates the
21 old version number of the specified file stored in a most recent version
22 number memory 35 with the received file number and then returns an
23 acknowledgment message to the server 13 via the line transmitter 31.
24 Controller 34 is also connected to the line receiver 32 to receive location
25 registration requests and accompanying version numbers of specified

1 files from the network 11. In response to a location registration request
2 from the network, the home location register 12 compares the version
3 number of a file contained in the request with the most recent version of
4 the file stored in the memory 35 to determine if they match or mismatch.
5 If they mismatch, the home location register 12 sends a download
6 request to the server 13.

7 Fig. 5 is the flowchart of the operation of the home location
8 register 12. Home location register 12 monitors the outputs of the line
9 receivers 30 and 32 to check to see if a new file number is received from
10 the server 13 (block 201) or a location registration request is received
11 from the network (block 204). When the home location register 12
12 receives a new version number of a specified file from the server 13, the
13 home location register 12 proceeds from block 201 to block 202 to
14 update the old version number of the specified file stored in the memory
15 35 with the received new version number and returns an
16 acknowledgment message to the server 13 (block 203). When the home
17 location register 12 receives a location registration request from the
18 network 11, its controller proceeds from block 204 to block 205 to
19 compare the version number of a file contained in the location
20 registration request to the most recent version number of the file stored
21 in the memory 35. If they match (block 206), the routine is terminated.
22 If they mismatch, the home location register 12 determines that the
23 version number of the requesting mobile terminal is older than its most
24 recent version number, and proceeds from block 206 to block 207 to send
25 a download request to the server 13 via the line transmitter 31. This

1 download request contains the telephone number of the requesting
2 mobile terminal.

3 In Fig. 6, the server 13 includes a controller 45 which is connected
4 to the home location register 12 via a line receiver 40 and a line
5 transmitter 41 and further connected to the network 11 via a line
6 receiver 42 and a line transmitter 43. Additionally, a line receiver 44 is
7 provided to interface the controller 45 to the network manager 14. A
8 memory 46 holds the most recent program for operating mobile
9 terminals, associated files and file version numbers. Controller 45
10 updates the contents of the memory 45 with data downloaded from the
11 network manager 14.

12 According to the flowchart shown in Fig. 7A, a file update routine
13 of the server 13 starts with block 301 where the server 13 checks to see if
14 any of the stored files in the memory 46 has been updated with a new
15 file downloaded from the network manager 14. If this is the case, the
16 server 13 reads the version number of the updated file from the memory
17 45 and sends it to the home location register 12 (block 302) and waits for
18 an acknowledgment message from the home location register. If an
19 acknowledgment message is not received within a specified period of
20 time from the home location register (block 303), the server 13 returns to
21 block 302 to retransmit the version number of the new file. If an
22 acknowledgment message is received within the specified time period
23 (block 303), the server terminates the routine.

24 In Fig. 7B, the server 13 begins a download routine in response to
25 a download request message sent from the home location register 12

1 (block 310) by reading the mobile's telephone number contained in the
2 received message (block 311). Server 13 begins a file transfer in block
3 312 by transmitting the updated most recent file data to the requesting
4 mobile terminal via the communications network 11. When the file
5 transfer is completed, the server 13 waits for a positive or a negative
6 acknowledgment message from the mobile terminal (block 313). If a
7 negative acknowledgment message is received, the server 13 returns to
8 block 312 to repeat the file transfer until it receives a positive
9 acknowledgment message from the mobile terminal.

10 For a full understanding of the present invention, the overall
11 operation of the client-server system of the first embodiment is shown in
12 the sequence diagram of Fig. 8.

13 Network manager 14 provides overall control of the client-server
14 system by making improvements to files used in the client terminals at
15 intervals. When improvements have been made of a given file and the
16 version number of the file is updated, the new file data and the new
17 version number are transmitted from the network manager 14 to the
18 server 13 to update the old file data and its version number (see also
19 block 301, Fig. 7A). The new version number is then transmitted from
20 the server 13 to the home location register 12 (block 302, Fig. 7A). If the
21 transmitted new version number is successfully received (block 201, Fig.
22 5), the home location register 12 updates the old version number of the
23 file stored in the version number memory 35 with the received number
24 (block 202) and returns an acknowledgment message to the server 13
25 (block 203).

1 When a mobile terminal 10 sends a location registration request
2 containing the version number of the given file to the network 11 and
3 the home location register 12 receives it through the network 11 (block
4 204, Fig. 5), the home location register compares the version number
5 contained in the request to the most recent version number of the file
6 stored in the version number memory 35 (block 205). If the version
7 number contained in the location registration request differs from the
8 most recent number (block 206), the home location register sends a
9 download request containing the phone number of the mobile terminal
10 to the server 13 (block 207). In response to the download request, the
11 server 13 sends the file data of the most recent version to the mobile
12 terminal 10 through the network 11 (blocks 310 to 313, Fig. 7B). Mobile
13 terminal 10 updates its old file with the new file sent from the server 13
14 if no error is detected in the received file, and returns a positive
15 acknowledgment to the server 13 via the network 11.

16 The present invention allows efficient updating of user's installed
17 data by sending a single location registration request to the network
18 whenever the user triggers an event on the mobile terminal such as
19 power-on state, or an operating state of a start-of-call key and an end-
20 of-call key, even though the user is not intended to do so. The traffic
21 load on the communication network is thus reliably and evenly
22 distributed among mobile terminals.

23 In a second embodiment of the present invention, the mobile
24 terminal, the home location register and the server of the present
25 invention may be modified as shown in Figs. 9, 10, 11 and 12. As shown

1 in Fig. 10, the home location register 12 of this modification additionally
2 includes a memory 36 in which a plurality of version numbers of a file
3 are mapped to a plurality of mobile's phone numbers, instead of storing
4 the version number of the file in the memory 20 of mobile terminal. In
5 addition, the server 13 operates according to the flowchart of Fig. 7A as
6 in the previous embodiment when a new file is sent from the network
7 manager 14. The second embodiment relieves the burden of each mobile
8 terminal from maintaining the version numbers of installed data by
9 shifting the burden to the home location register 12.

10 Specifically, the mobile terminal 10 operates according to the
11 flowchart of Fig. 9 in which block 400 is used to replace blocks 102 and
12 103 (Fig. 3) of the previous embodiment. Since no file version numbers
13 are stored in the mobile terminal, the location registration request is
14 simply sent to the network with no further information as indicated in
15 block 400.

16 Home location register 12 operates according to the flowchart of
17 Fig. 11. Home location register 12 operates in the same way as in the
18 previous embodiment until it receives a location registration request
19 from the mobile terminal (block 204). In response to the location
20 registration request, the home location register 12 compares the file
21 version number of the requesting mobile terminal stored in a location of
22 the memory 36 identified by the mobile's phone number to the most
23 recent file version number stored in the memory 35 (block 500). If they
24 mismatch (block 501), a download request is sent from the home
25 location register to the server 13, containing the mobile's phone number

1 (block 502).

2 In Fig. 12, the server 13 performs a file transfer in the same way as
3 in the flowchart of Fig. 7B in response to the download request from the
4 home location register (blocks 310 to 312) and waits for a positive
5 acknowledgment message from the mobile terminal (block 313). When
6 a positive acknowledgment message is received from the mobile
7 terminal, the server sends an acknowledgment message to the home
8 location register (block 600), and terminates the routine.

9 Returning to Fig. 11, the home location register receives an
10 acknowledgment message from the server (block 503). In response to
11 this message, the home location register proceeds to update the mobile's
12 file version number in the memory 36 with the most recent file version
13 number stored in the memory 35, and terminates the routine.

14 The overall operation of the client-server system of the second
15 embodiment is shown in the sequence diagram of Fig. 13.

16 Similar to the first embodiment, when improvements have been
17 made of a given file and the version number of the file is updated, the
18 new file data and the new version number are transmitted from the
19 network manager 14 to the server 13 to update the old file data and its
20 version number (block 301, Fig. 7A). The new version number is then
21 transmitted from the server 13 to the home location register 12 (block
22 302). If the transmitted new version number is successfully received
23 (block 201, Fig. 11), the home location register 12 updates the old version
24 number of the file stored in the version number memory 35 with the
25 received number (block 202, Fig. 11) and returns an acknowledgment

1 message to the server 13 (block 203, Fig. 11).

2 When a mobile terminal 10 sends a location registration request
3 to the network 11 and the home location register 12 receives it through
4 the network 11 (block 204, Fig. 11), the home location register compares
5 the mobile's file version number stored in the memory 36 corresponding
6 to the mobile's phone number to the most recent version number of the
7 file stored in the version number memory 35 (block 500, Fig. 11). If the
8 mobile's version number in memory 36 differs from the most recent
9 number in memory 35 (block 501), the home location register sends a
10 download request containing the phone number of the mobile terminal
11 to the server 13 (block 502). In response to the download request, the
12 server 13 sends the file data of the most recent version to the mobile
13 terminal 10 through the network 11 (blocks 310 to 312, Fig. 12). Mobile
14 terminal 10 updates its old file with the new file sent from the server 13
15 if no error is detected in the received file, and returns a positive
16 acknowledgment message to the server 13 via the network 11. When
17 the server receives this message from the mobile terminal (block 313,
18 Fig. 12), it sends an acknowledgment message back to the home location
19 register (block 600, Fig. 12). In response to this acknowledgment
20 message, the home location register updates the mobile's file version
21 number in memory 36 with the most recent file version number in
22 memory 35 (blocks 503, 504, Fig. 11).

23 A further modification of the present invention is shown in Figs.
24 14 and 15.

25 Controller 45 of the server 13 is programmed to perform the

1 routine of Fig. 14. In this routine, the server 13 monitors the download
2 request traffic from the home location register 12 and imposes a
3 restriction control on the file transfer traffic through the network to
4 prevent it from being overloaded. Specifically, the server 13 sets a count
5 variable D to zero (block 701). When a download request is received
6 from the home location register (block 702), the count variable D is
7 incremented by one (block 703) and a timer is set (block 704). Count
8 variable D is then compared to a reference value M (block 705). If D is
9 not greater than M, flow exits to block 707 to check to see if a
10 predetermined period set by the timer has expired. If the timer is not
11 expired, blocks 702 to 705 are repeated. Otherwise, flow proceeds from
12 block 707 to block 708 to decrement the count value D by one and
13 returns to block 702. Thus, the count value D represents the traffic rate
14 of download requests which may be received from one or more home
15 location registers. If the count value D is greater than M, the server 13
16 determines that a traffic congestion has occurred and sends a traffic
17 congestion message to the home location register 12 (block 706).

18 Home location register 12 operates according to the flowchart of
19 Fig. 15. In this routine, the home location register monitors the location
20 registration request traffic from the network 11 and imposes a
21 restriction control on the traffic of its download requests to the server.
22 In Fig. 15, the home location register 12 sets a count variable R to zero
23 (block 801). When a location registration request is received from the
24 network 11 (block 802), the count variable R is incremented by one
25 (block 803) and a timer is set (block 804). Count variable R is then

1 compared to a reference value N (block 805). If R is not greater than N,
2 flow proceeds from block 805 to block 806 to determine whether a traffic
3 congestion message is received from the server. If not, flow exits to
4 block 808 to check for the expiration of the timer. If the timer is still
5 running, blocks 802 to 806 are repeated. If the timer has expired, the
6 count value R is decremented by one (block 809) and returns to block
7 802 to continue the counting process. If R is greater than N or a traffic
8 congestion message is received from the server, the home location
9 register proceeds to block 807 to discontinue the transmission of
10 download requests to the server.

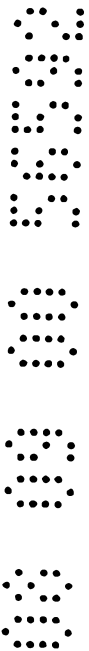
11 In a further modification of the first embodiment of the present
12 invention, the mobile terminal 10 stores a set of data modules and a set
13 of version numbers of the data modules. In response to an event
14 triggered by the user of the mobile terminal, a location registration
15 request containing the set of version numbers and a phone number of
16 the mobile terminal. The server 13 stores a set of most recent data
17 modules and version numbers of the most recent data modules. Home
18 location register 12 receives a set of version numbers of the most recent
19 data modules which is transmitted from the server 13 whenever the
20 network manager 14 makes a change in previous data modules. Home
21 location register 12 maintains the received set of version numbers in the
22 memory 35. In response to a location registration request from the
23 mobile terminal, the home location register 12 compares the version
24 numbers contained in the received request to the stored version
25 numbers and requests the server 13 to transmit a copy of the set of most
26 recent data modules and the version numbers of the most recent data

1 modules to the client terminal via the communication network if there is
2 a mismatch between the compared version numbers. The mobile
3 terminal receives the copy of the most recent data modules and the
4 version numbers from the server system and updates the installed set of
5 data modules with the received copy and updates the stored version
6 numbers with the received version numbers.

7 According to a further modification of the second embodiment of
8 the present invention, the mobile terminal stores a set of data modules
9 and transmits a request message to the home location register 12 via the
10 communication network in response to an event triggered by the user of
11 the mobile terminal, containing a phone number of the mobile terminal.
12 The server 13 stores a set of most recent data modules and version
13 numbers of the most recent data modules. Home location register 12
14 receives a set of version numbers of the most recent data modules from
15 the server 13 which is transmitted whenever the network manager 14
16 makes a change in previous data modules. Home location register 12
17 stores a set of most recent data modules. Additionally, it stores a
18 plurality of version numbers of the most recent data modules in the first
19 memory 35 and maps a plurality of sets of version numbers of data
20 modules of mobile terminals to a plurality of phone numbers of the
21 mobile terminals in the second memory 36. Home location register 12,
22 on receiving a location registration request from the mobile terminal,
23 compares a set of version numbers mapped in the second memory 36
24 corresponding to the phone number contained in the received request to
25 the set of version numbers of the most recent data modules stored in the
26 first memory 35. If there is a mismatch between the compared version
27 numbers, the home location register 12 requests the server 13 to

1 transmit a copy of the set of most recent data modules to the mobile
2 terminal via the communication network and updates the
3 corresponding set of mapped version numbers in the second memory 36
4 with the version numbers of the first memory 35. The mobile terminal,
5 on receiving the copy of the most recent data modules from the server,
6 updates the installed set of data modules with the received copy.

7 Such modifications allows efficient updating of a number of data
8 modules by sending only one location registration request to the
9 network whenever the user triggers an event on the mobile terminal
10 such as power-on state, or an operating state of a start-of-call key and
11 an end-of-call key, even though the user is not intended to do so.



~~What is claimed is:~~

The claims defining the invention are as follows:

- 1 1. A method of updating data installed on a client terminal
- 2 from a server system via a communication network, comprising:
- 3 at said client terminal,
- 4 (a) storing a version number of the
- 5 installed data;
- 6 (b) transmitting a request message to the server system via
- 7 the communication network in response to an event triggered by a user
- 8 of said client terminal, said request message containing the version
- 9 number of said data and a phone number of said client terminal,
- 10 at said server system,
- 11 (c) storing most recent data and a version number of the
- 12 most recent data;
- 13 (d) receiving the transmitted request and comparing the
- 14 version number contained in the received request to the stored version
- 15 number;
- 16 (e) transmitting a copy of said most recent data and the
- 17 version number of the most recent data to said client terminal via the
- 18 communication network if there is a mismatch between the compared
- 19 version numbers, and
- 20 at said client terminal,
- 21 (f) receiving the copy of the most recent data and the
- 22 version number from the server system and updating the installed data
- 23 with the received copy and updating the stored version number with the
- 24 received version number.

1 2. A method of updating data installed on a client terminal
2 from a server system via a communication network, comprising:

3 at said client terminal,

4 (a) transmitting a request message to the server system via
5 the communication network in response to an event triggered by a user
6 of said client terminal, said request message containing a phone number
7 of said client terminal,

8 at said server system,

9 (b) storing most recent data and storing a version number
10 of the most recent data in a first memory and mapping a plurality of
11 version numbers of said data to a plurality of phone numbers in a
12 second memory;

13 (c) receiving the request transmitted from said client
14 terminal and comparing a version number mapped in said second
15 memory corresponding to the phone number contained in the received
16 request to the version number of the most recent data stored in said first
17 memory;

18 (d) if there is a mismatch between the compared version
19 numbers, transmitting a copy of said most recent data to said client
20 terminal via the communication network and updating said
21 corresponding mapped version number in said second memory with the
22 version number of the first memory,

23 at said client terminal,

24 (e) receiving the copy of the most recent data from the
25 server system and updating the installed data with the received copy.

1 3. A method of updating a set of data modules installed on a

2 client terminal from a server system via a communication network,
3 comprising:
4 at said client terminal,
5 (a) storing a set of version numbers of the installed data
6 modules;
7 (b) transmitting a request message to the server system via
8 the communication network in response to an event triggered by a user
9 of said client terminal, said request message containing said set of
10 version numbers and a phone number of the client terminal,
11 at said server system,
12 (c) storing a set of most recent data modules and version
13 numbers of the most recent data modules;
14 (d) receiving the transmitted request and comparing the
15 version numbers contained in the received request to the stored version
16 numbers;
17 (e) transmitting a copy of the set of most recent data
18 modules and the version numbers of the most recent data modules to
19 said client terminal via the communication network if there is a
20 mismatch between the compared version numbers, and
21 at said client terminal,
22 (f) receiving the copy of the most recent data modules and
23 the version numbers from the server system and updating the installed
24 set of data modules with the received copy and updating the stored
25 version numbers with the received version numbers.

1 4. A method of updating a set of data modules installed on a
2 client terminal from a server system via a communication network,

3 comprising:

4 at said client terminal,

5 (a) transmitting a request message to the server system via
6 the communication network in response to an event triggered by a user
7 of said client terminal, said request message containing a phone number
8 of said client terminal,

9 at said server system,

10 (b) storing a set of most recent data modules, storing a set of
11 version numbers of the most recent data modules in a first memory, and
12 mapping a plurality of sets of version numbers of data modules of
13 mobile terminals to a plurality of phone numbers of said mobile
14 terminals in a second memory;

15 (c) receiving the request transmitted from said client
16 terminal and comparing a set of version numbers mapped in said
17 second memory corresponding to the phone number contained in the
18 received request to the set of version numbers of the most recent data
19 modules stored in said first memory;

20 (d) if there is a mismatch between the compared version
21 numbers, transmitting a copy of the set of most recent data modules to
22 said client terminal via the communication network and updating the
23 corresponding set of mapped version numbers in said second memory
24 with the version numbers of the first memory,

25 at said client terminal,

26 (e) receiving the copy of the most recent data modules from
27 the server system and updating the installed set of data modules with
28 the received copy.

1 5. The method of claim 1, 2, 3 or 4, further comprising, at said
2 server system, imposing traffic control on the transmission of said copy
3 of most recent data when traffic of the request from said client terminal
4 exceeds a predetermined rate.

1 6. The method of claim 1, 2, 3 or 4, wherein said client terminal
2 is a wireless mobile terminal and said communication network is a
3 mobile communication network.

1 7. The method of claim 6, wherein said server system
2 comprises a home location register connected to said mobile
3 communication network and a server connected to said home location
4 register and said network, and wherein said request from the client
5 terminal is a location registration request.

1 8. The method of claim 1 or 3, wherein the step (c) further
2 comprises, at said server system, receiving new data from a network
3 manager when the network manager makes a change in previous data
4 and storing the new data as said most recent data.

1 9. The method of claim 2 or 4, wherein the step (b) further
2 comprises, at said server system, receiving new data from a network
3 manager when the network manager makes a change in previous data
4 and storing the new data as said most recent data.

1 10. A method of updating data installed on a client terminal,
2 comprising:

3 at said client terminal,

4 (a) storing a version number of the installed data; and

5 (b) transmitting a request message to a receiving server via
6 a communication network in response to an event triggered by a user of
7 said client terminal, said request message containing the version
8 number of said data and a phone number of the client terminal,

9 at said receiving server,

10 (c) storing a version number of most recent data;

11 (d) receiving the request from the client terminal via the
12 communication network and comparing the version number contained
13 in the received request to the stored version number; and

14 (e) transmitting a download request to a sending server if
15 there is a mismatch between the compared version numbers,

16 at said sending server,

17 (f) storing said most recent data and transmitting a copy of
18 said most recent data and the version number of the most recent data to
19 said client terminal via the communication network in response to said
20 download request from the receiving server, and

21 at said client terminal,

22 (g) receiving the copy of the most recent data and the
23 version number from the sending server and updating the installed data
24 with the received copy and updating the stored version number with the
25 received version number.

1 11. A method of updating data installed on a client terminal,
2 comprising:

3 at said client terminal,

4 (a) transmitting a request message to a receiving server via
5 a communication network in response to an event triggered by a user of
6 said client terminal, said request message containing a phone number of
7 said client terminal,

8 at said receiving server,

9 (b) storing a version number of most recent data in a first
10 memory and mapping a plurality of version numbers of said data to a
11 plurality of phone numbers in a second memory;

12 (c) receiving the request from said client terminal via the
13 communication network and comparing a version number mapped in
14 said third memory corresponding to the phone number contained in the
15 received request to the version number of the most recent data stored in
16 said second memory; and

17 (d) if there is a mismatch between the compared version
18 numbers, transmitting a download request message to a sending server
19 and updating said corresponding mapped version number in said
20 second memory with the version number of the first memory,

21 at said sending server,

22 (e) storing said most recent data and transmitting a copy of
23 said most recent data to said client terminal via the communication
24 network, and

25 at said client terminal,

26 (f) receiving the copy of the most recent data from the
27 sending server and updating the installed data with the received copy.

1 12. The method of claim 10 or 11, further comprising, at said
2 receiving server, imposing traffic control on said download request

3 when traffic of the request from said client terminal exceeds a
4 predetermined rate.

1 13. The method of claim 10 or 11, further comprising, at said
2 sending server, imposing traffic control on the transmission of said copy
3 of most recent data when traffic of the download request from said
4 receiving server exceeds a predetermined rate.

1 14. The method of claim 10 or 11, wherein said client terminal is
2 a wireless mobile terminal and said communication network is a mobile
3 communication network, and wherein said receiving server is a home
4 location register connected to said network and said sending server, and
5 wherein said request from the client terminal is a location registration
6 request.

1 15. The method of claim 10, wherein the step (f) further
2 comprises, at said sending server, receiving new data from a network
3 manager when the network manager makes a change in previous data
4 and storing the new data as said most recent data.

1 16. The method of claim 11, wherein the step (e) further
2 comprises, at said sending server, receiving new data from a network
3 manager when the network manager makes a change in previous data
4 and storing the new data as said most recent data.

1 17. A client-server system comprising:
2 a client terminal for storing a version number of data installed on

3 the client terminal and transmitting a request message to a
4 communication network in response to an event triggered by a user of
5 said client terminal, said request message containing the version
6 number of said data and a phone number of said client terminal; and
7 a server system for storing most recent data and a version
8 number of the most recent data, receiving said request from the client
9 terminal via said communication network and comparing the version
10 number contained in the received request to the stored version number,
11 and transmitting a copy of said most recent data and the version
12 number of the most recent data to said client terminal via the
13 communication network if there is a mismatch between the compared
14 version numbers,
15 said client terminal receiving the copy of the most recent data
16 and the version number from the server system and updating the
17 installed data with the received copy and updating the stored version
18 number with the received version number.

1 18. A client-server system comprising:
2 a client terminal for transmitting a request message to a
3 communication network in response to an event triggered by a user of
4 said client terminal, said request message containing a phone number of
5 said client terminal,
6 a server system for storing most recent data and a version
7 number of the most recent data in a first memory and mapping a
8 plurality of version numbers of said data to a plurality of phone
9 numbers in a second memory, receiving said request from said client
10 terminal via said communication network, comparing a version number

11 mapped in said second memory corresponding to the phone number
12 contained in the received request to the version number of the most
13 recent data stored in said first memory, and transmitting a copy of said
14 most recent data to said client terminal via the communication network
15 and updating said corresponding mapped version number in said
16 second memory with the version number of the first memory if there is a
17 mismatch between the compared version numbers,
18 said client terminal receiving the copy of the most recent data
19 from the server system and updating the installed data with the
20 received copy.

1 19. A client-server system comprising:
2 a client terminal for storing a set of version numbers of data
3 modules installed on the client terminal, transmitting a request message
4 to a communication network in response to an event triggered by a user
5 of said client terminal, said request message containing said set of
6 version numbers and a phone number of the client terminal;
7 a server system for storing a set of most recent data modules and
8 version numbers of the most recent data modules, receiving the request
9 from the client terminal via said communication network, comparing
10 the version numbers contained in the received request to the stored
11 version numbers, and transmitting a copy of the set of most recent data
12 modules and the version numbers of the most recent data modules to
13 said client terminal via the communication network if there is a
14 mismatch between the compared version numbers;
15 said client terminal receiving the copy of the most recent data
16 modules and the version numbers from the server system and updating

17 data modules installed on the client terminal with the received copy and
18 updating the stored version numbers with the received version
19 numbers.

1 20. A client-server system comprising:
2 a client terminal for transmitting a request message to a
3 communication network in response to an event triggered by a user of
4 said client terminal, said request message containing a phone number of
5 said client terminal; and
6 a server system for storing a set of most recent data modules,
7 storing a set of version numbers of the most recent data modules in a
8 first memory, mapping a plurality of sets of version numbers of data
9 modules of mobile terminals to a plurality of phone numbers of said
10 mobile terminals in a second memory, receiving the request transmitted
11 from said client terminal and comparing a set of version numbers
12 mapped in said second memory corresponding to the phone number
13 contained in the received request to the set of version numbers of the
14 most recent data modules stored in said first memory, and transmitting
15 a copy of the set of most recent data modules to said client terminal via
16 the communication network and updating the corresponding set of
17 mapped version numbers in said second memory with the version
18 numbers of the first memory if there is a mismatch between the
19 compared version numbers,
20 said client terminal receiving the copy of the most recent data
21 modules from the server system and updating data modules installed on
22 the client terminal with the received copy.

1 21. The system of claim 17, 18, 19 or 20, wherein said server
2 system is configured to impose traffic control on the transmission of said
3 copy of most recent data when traffic of the request from said client
4 terminal exceeds a predetermined rate.

1 22. The system of claim 17, 18, 19 or 20, wherein said client
2 terminal is a wireless mobile terminal and said communication network
3 is a mobile communication network.

1 23. The system of claim 22, wherein said server system
2 comprises a home location register connected to said mobile
3 communication network and a server connected to said home location
4 register and said network, and wherein said request from the client
5 terminal is a location registration request.

1 24. The method of claim 17, 18, 19 or 20, wherein said server
2 system is configured to receive new data from a network manager when
3 the network manager makes a change in previous data and storing the
4 new data as said most recent data.

1 25. A client-server system comprising:
2 a client terminal for storing a version number of data installed on
3 the client terminal, and transmitting a request message to a
4 communication network in response to an event triggered by a user of
5 said client terminal, said request message containing the version
6 number of said data and a phone number of the client terminal; and
7 a receiving server for storing a version number of most recent

8 data, receiving the request from the client terminal via the
9 communication network, comparing the version number contained in
10 the received request to the stored version number, and transmitting a
11 download request to a sending server if there is a mismatch between the
12 compared version numbers,

13 said sending server storing said most recent data and
14 transmitting a copy of said most recent data and the version number of
15 the most recent data to said client terminal via the communication
16 network in response to said download request from the receiving server,

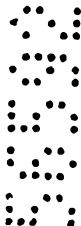
17 said client terminal receiving the copy of the most recent data
18 and the version number from the sending server and updating the
19 installed data with the received copy and updating the stored version
20 number with the received version number.

1 26. A client-server system comprising:


2 a client terminal for transmitting a request message to a
3 communication network in response to an event triggered by a user of
4 said client terminal, said request message containing a phone number of
5 said client terminal;

6 a receiving server for storing a version number of most recent
7 data in a first memory and mapping a plurality of version numbers of
8 said data to a plurality of phone numbers in a second memory, receiving
9 the request from said client terminal via the communication network
10 and comparing a version number mapped in said third memory
11 corresponding to the phone number contained in the received request to
12 the version number of the most recent data stored in said second
13 memory, and transmitting a download request message to a sending


14 server and updating said corresponding mapped version number in said
15 second memory with the version number of the first memory if there is
16 a mismatch between the compared version numbers,
17 said sending server storing said most recent data and
18 transmitting a copy of said most recent data to said client terminal via
19 the communication network,
20 said client terminal receiving the copy of the most recent data
21 from the sending server and updating the installed data with the
22 received copy.



1 27. The system of claim 25 or 26, wherein said receiving server
2 is configured to impose traffic control on said download request when
3 traffic of the request from said client terminal exceeds a predetermined
4 rate.



1 28. The system of claim 25 or 26, wherein said sending server is
2 configured to impose traffic control on the transmission of said copy of
3 most recent data when traffic of the download request from said
4 receiving server exceeds a predetermined rate.



1 29. The system of claim 25 or 26, wherein said client terminal is
2 a wireless mobile terminal and said communication network is a mobile
3 communication network, and wherein said receiving server is a home
4 location register connected to said network and said sending server, and
5 wherein said request from the client terminal is a location registration
6 request.

30. The system of claim 25 or 26, wherein said sending server is configured to receive new data from a network manager when the network manager makes a change in previous data and store the new data as said most recent data.

5 31. A method of updating data installed on a client terminal, said method being substantially as described herein with reference to any one of the embodiments, as that embodiment is described with reference to the accompanying drawings.

10 32. A method of updating a set of data modules installed on a client terminal from a server system via a communication network, said method being substantially as described herein with reference to any one of the embodiments, as that embodiment is described with reference to the accompanying drawings.

15 33. A client-server system substantially as described herein with reference to any one of the embodiments, as that embodiment is described with reference to the accompanying drawings.

DATED this Seventh Day of September, 2000

NEC Corporation

Patent Attorneys for the Applicant

SPRUSON & FERGUSON

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FIG. 1

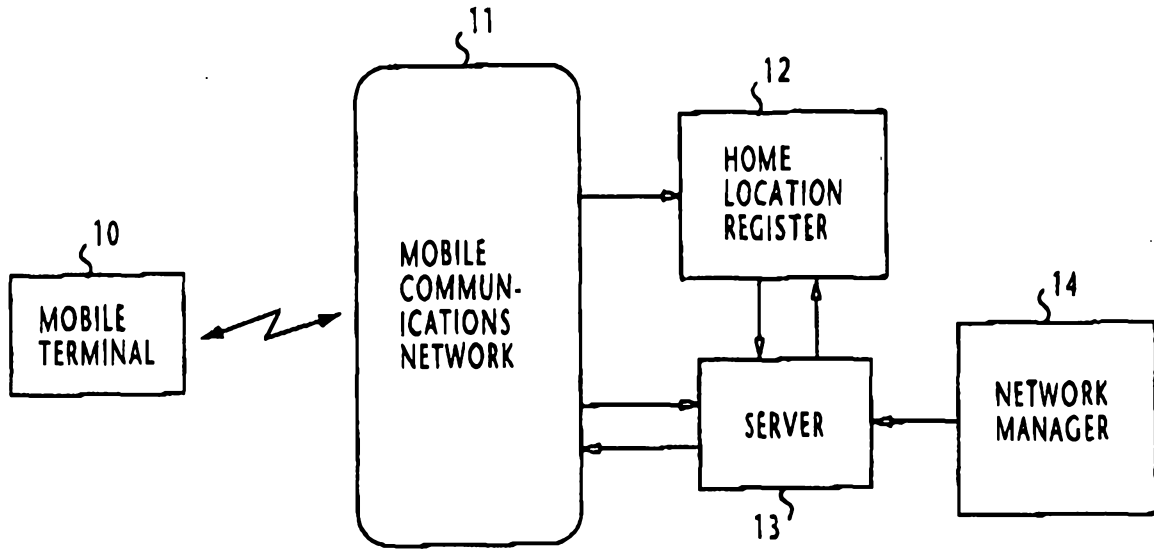


FIG. 2

MOBILE TERMINAL

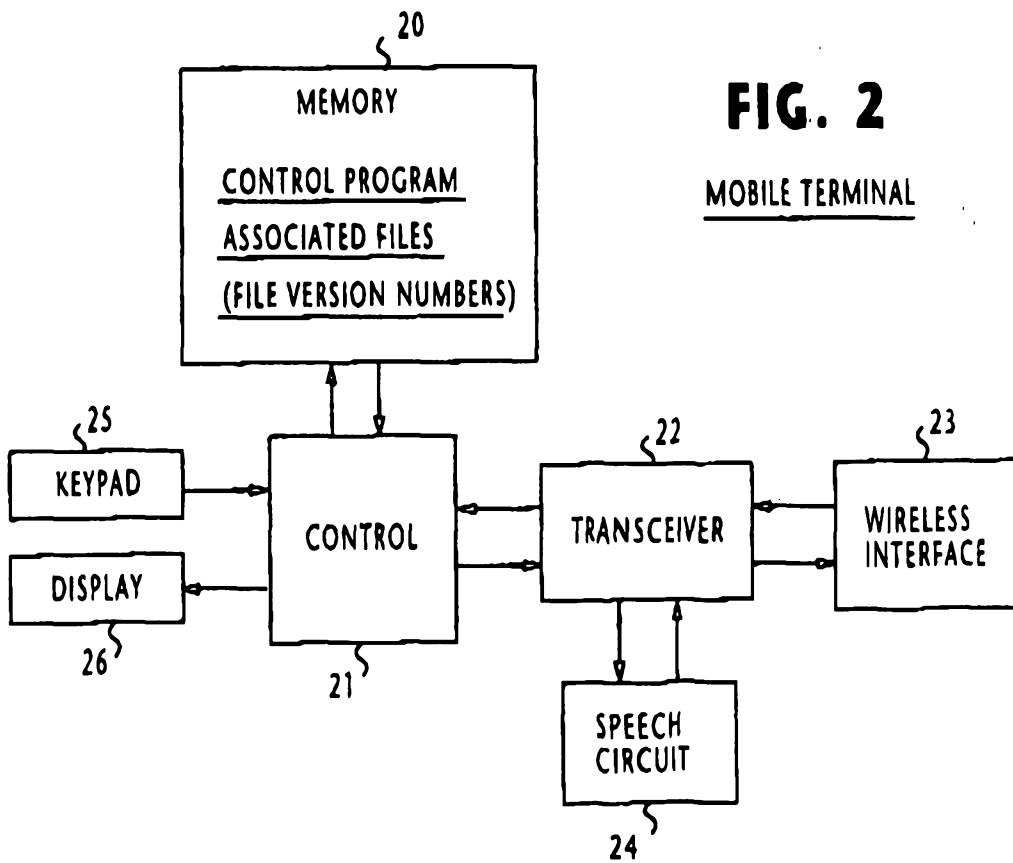


FIG. 3
MOBILE TERMINAL

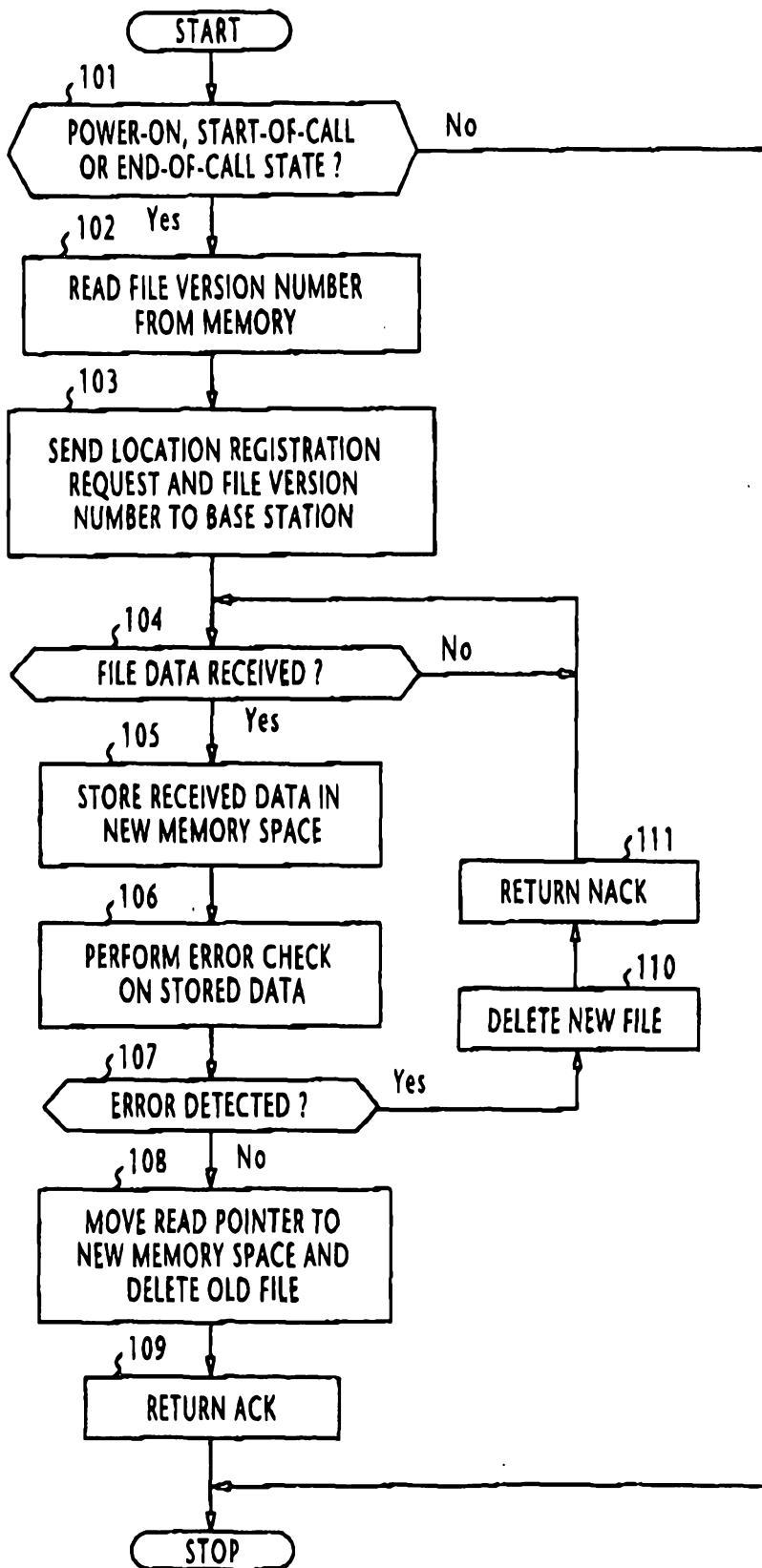


FIG. 4

HOME LOCATION REGISTER

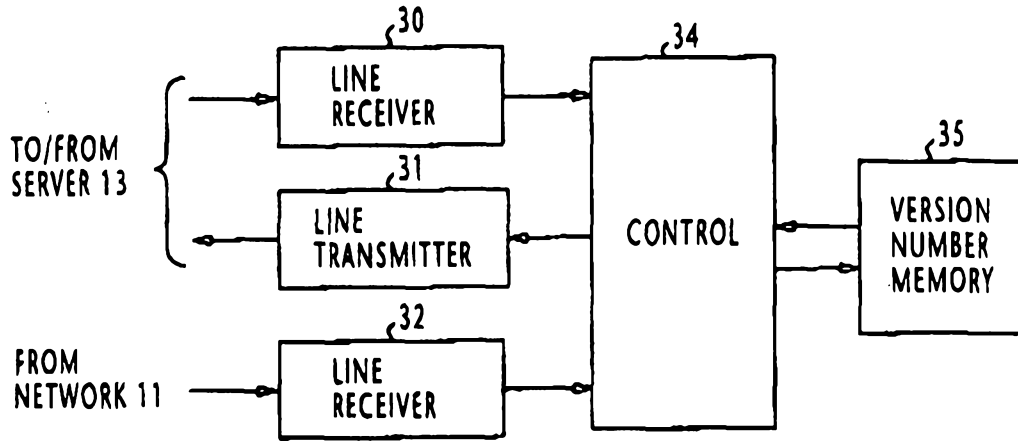


FIG. 5

HOME LOCATION REGISTER

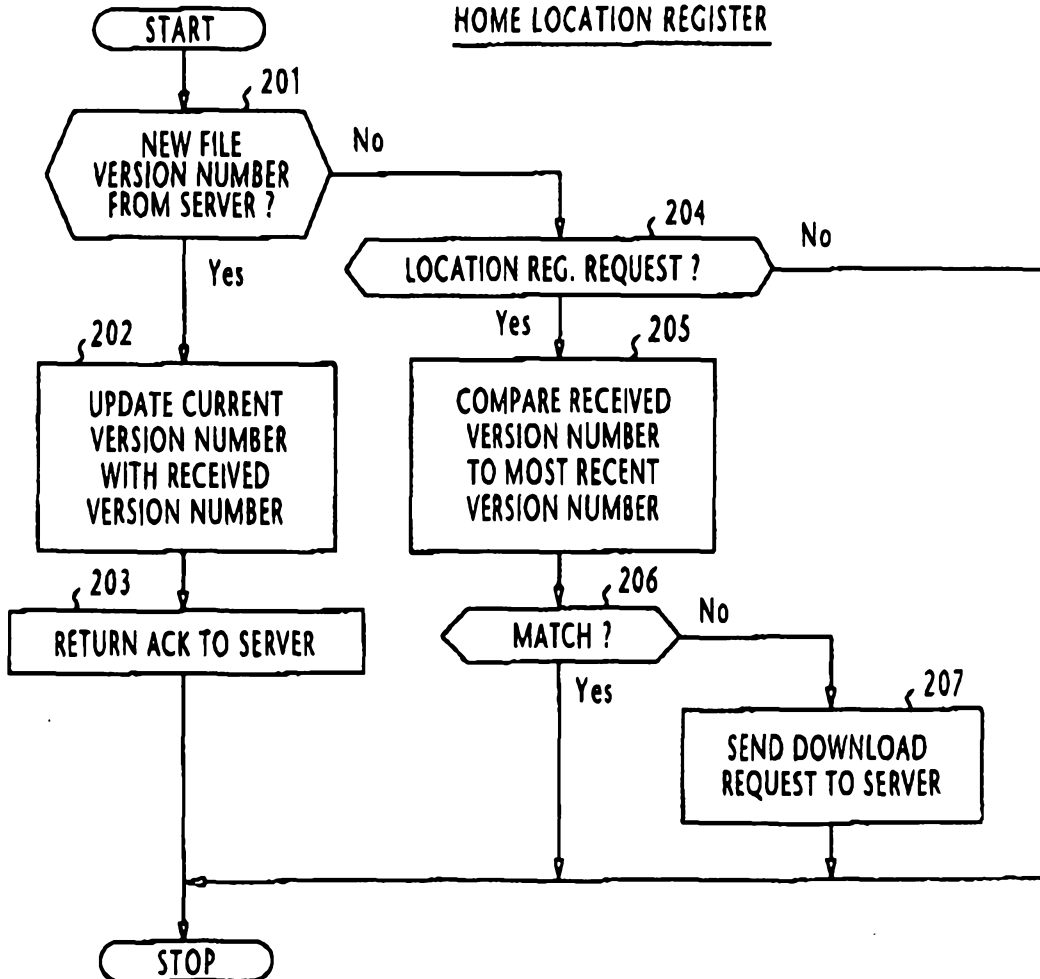


FIG. 6

SERVER

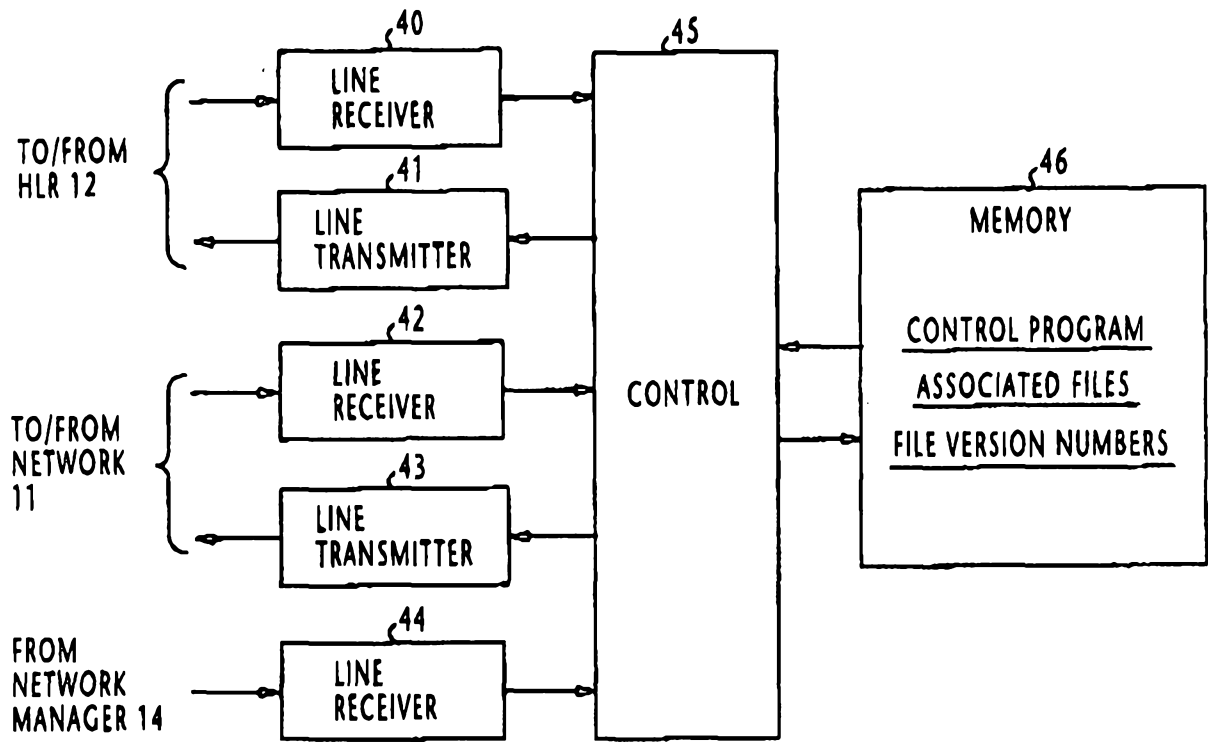


FIG. 7A

SERVER

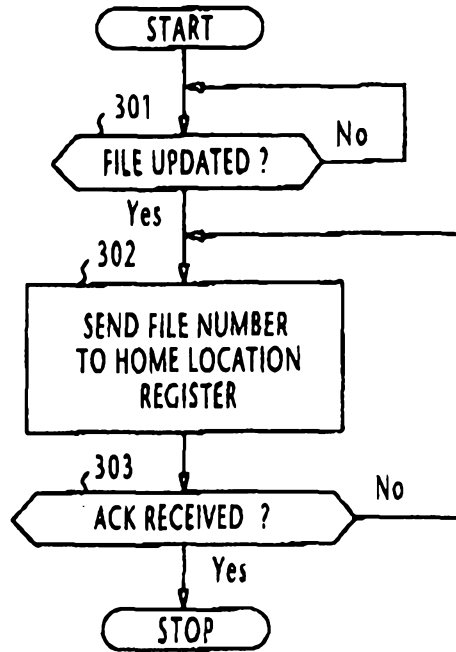


FIG. 7B

SERVER

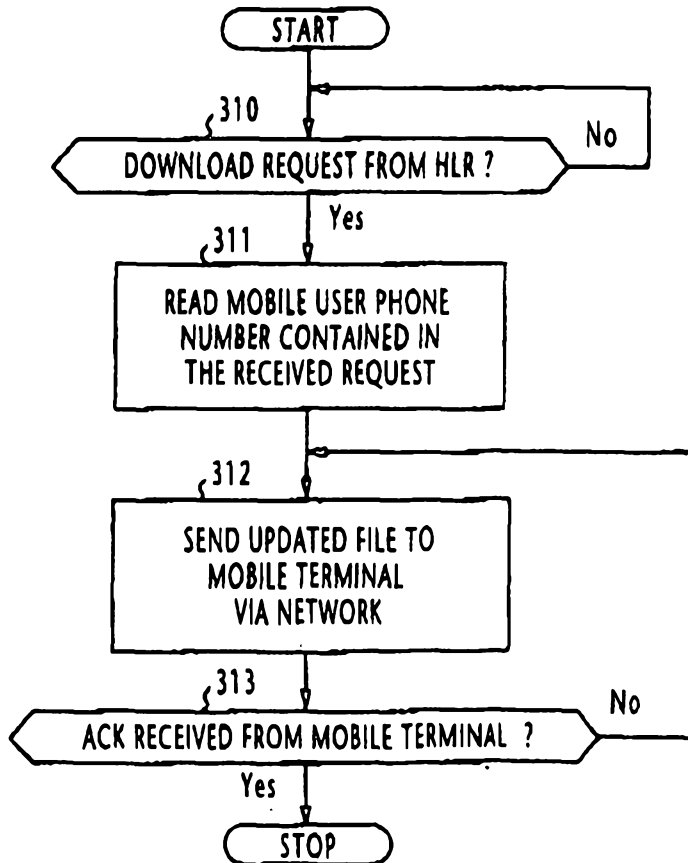


FIG. 8

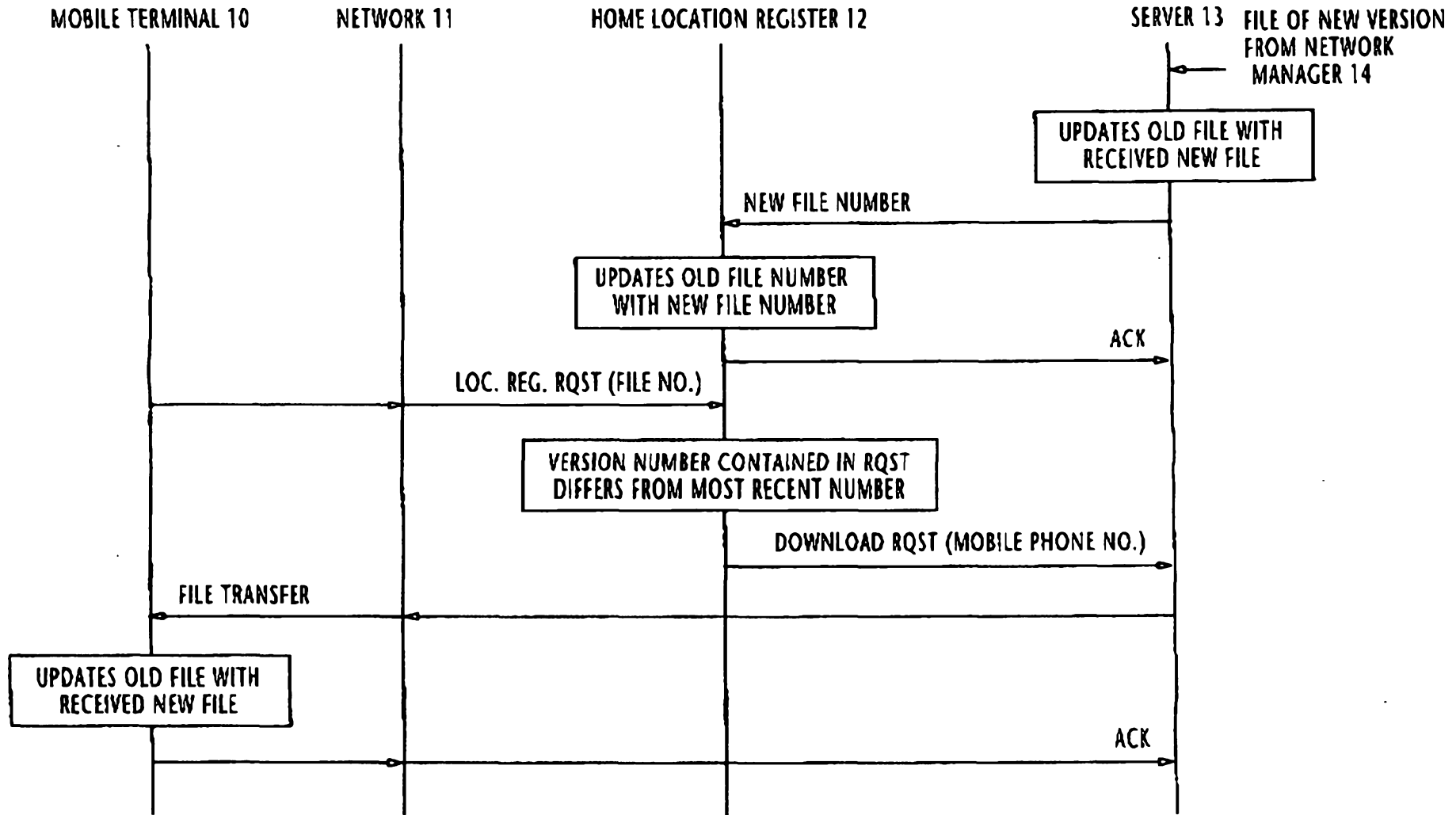


FIG. 9
MOBILE TERMINAL

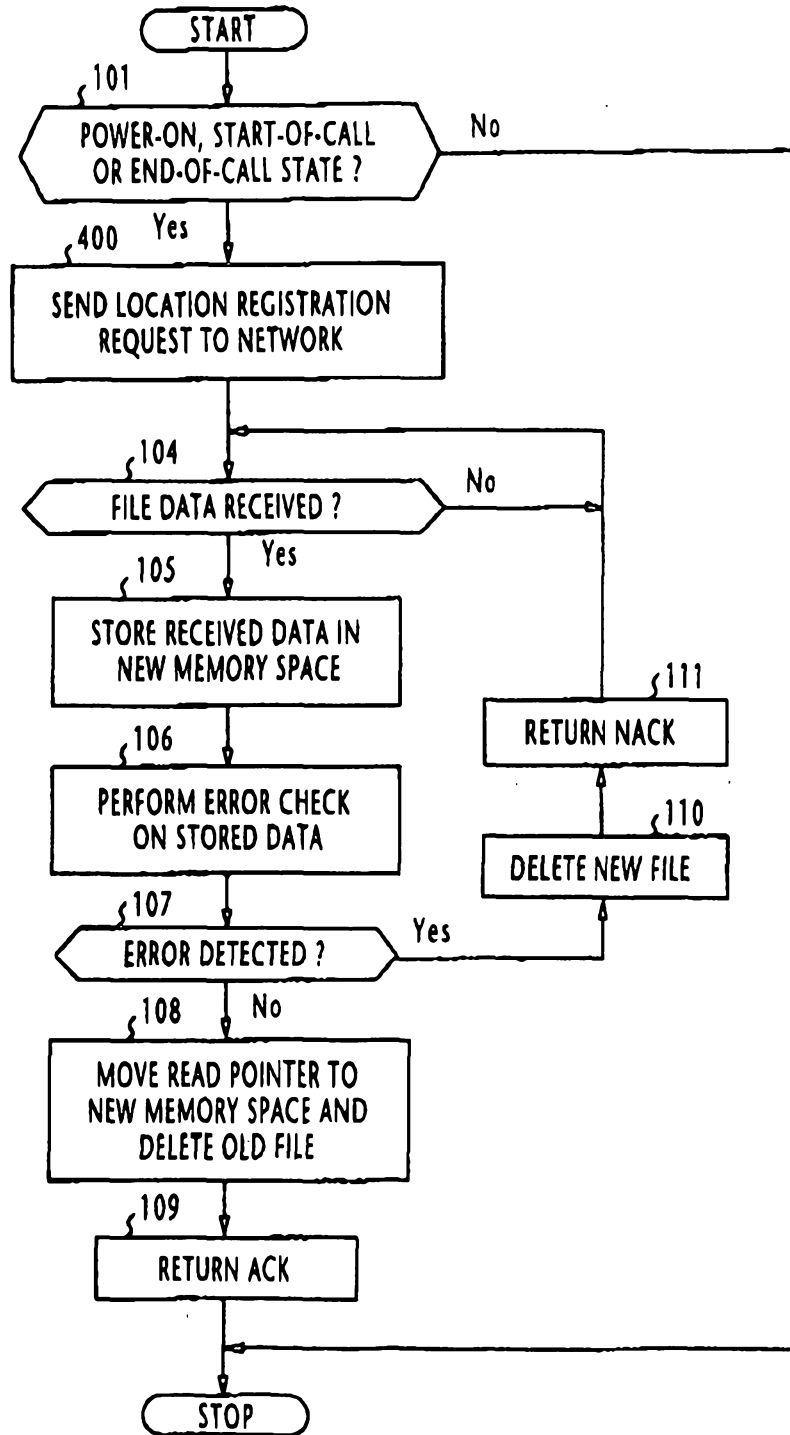


FIG. 10

HOME LOCATION REGISTER

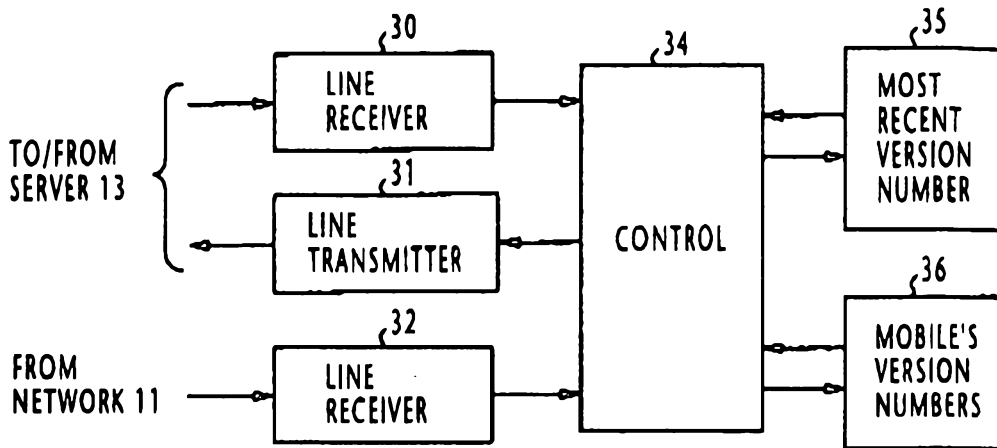


FIG. 11

HOME LOCATION REGISTER

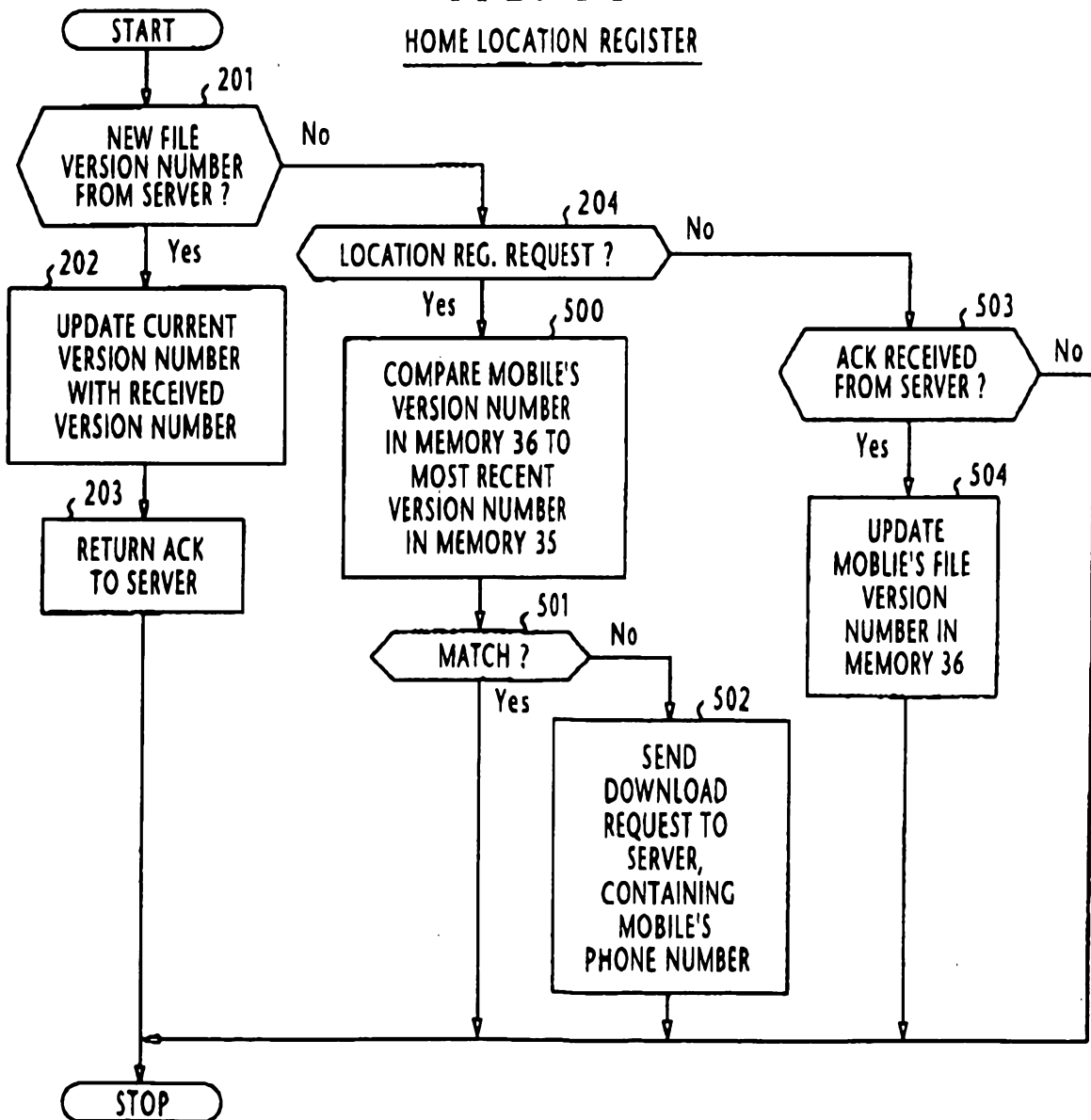


FIG. 12

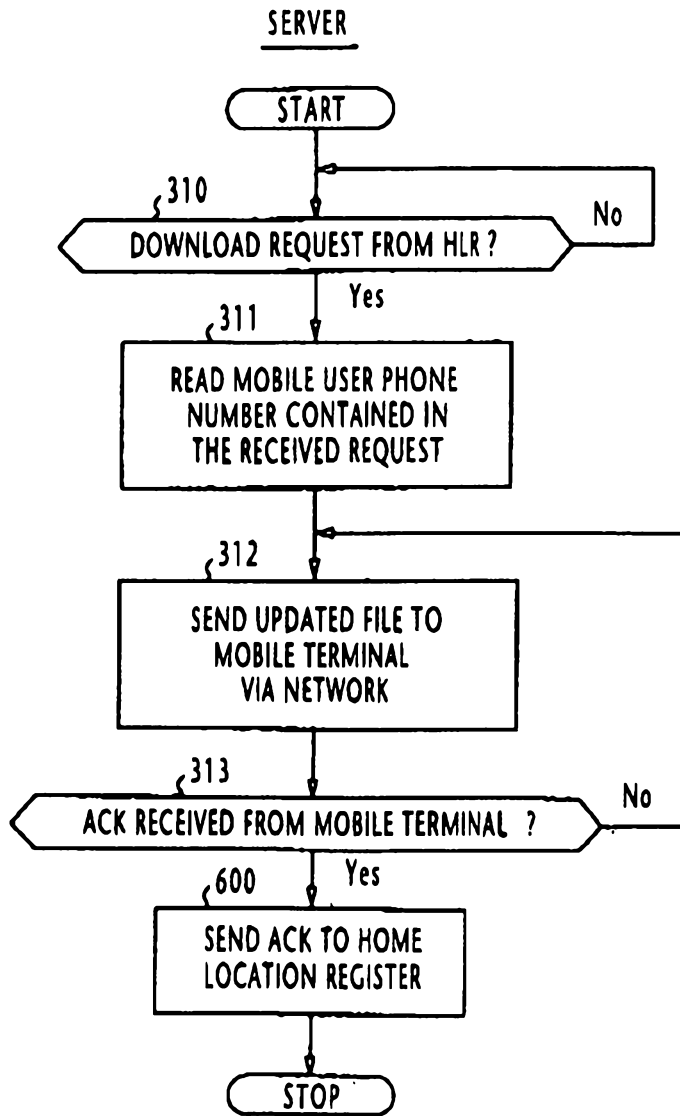
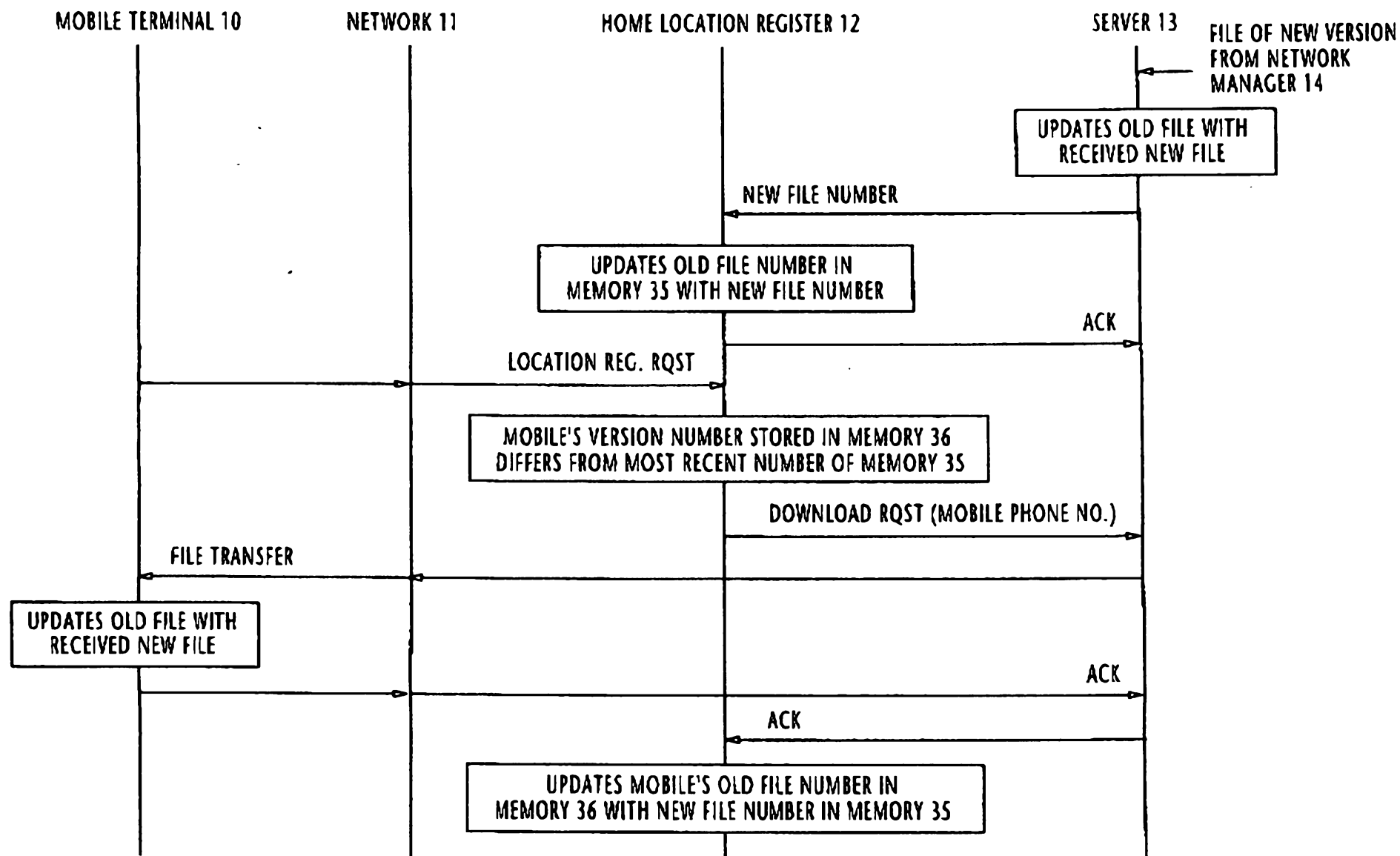




FIG. 13



10/12

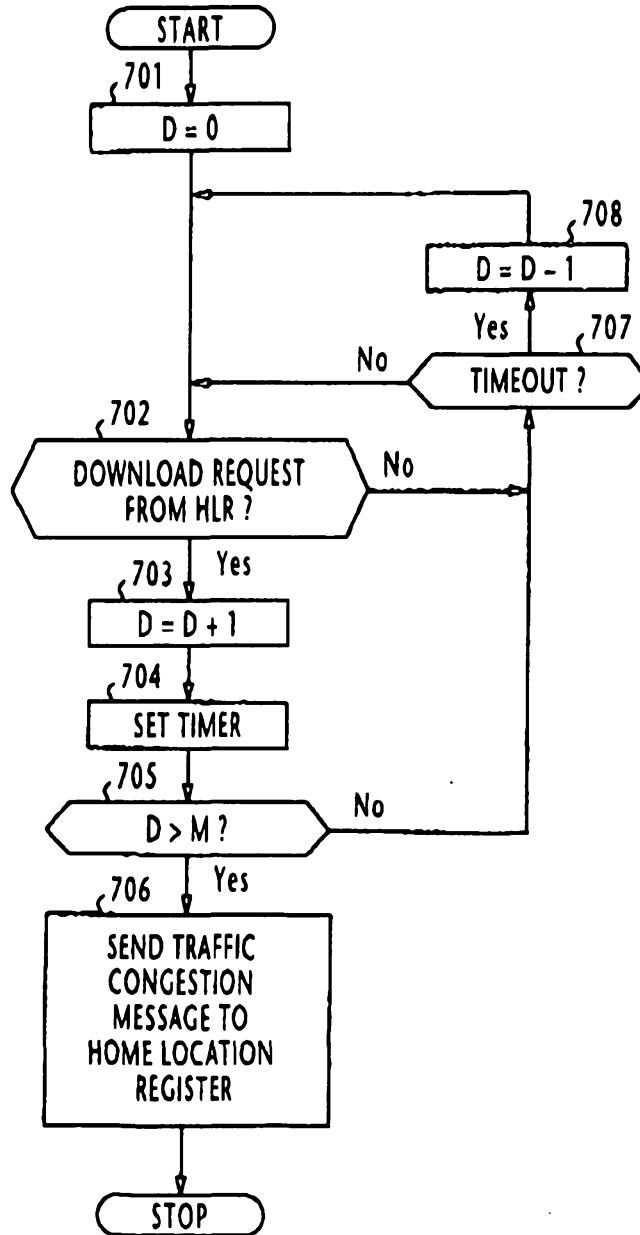
FIG. 14SERVER

FIG. 15

HOME LOCATION REGISTER

