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[Continued on next page]

(54) **Title:** SYSTEM AND METHOD FOR DYNAMICALLY ALLOCATING AN APPLICATION SESSION MANAGER AT RUNTIME

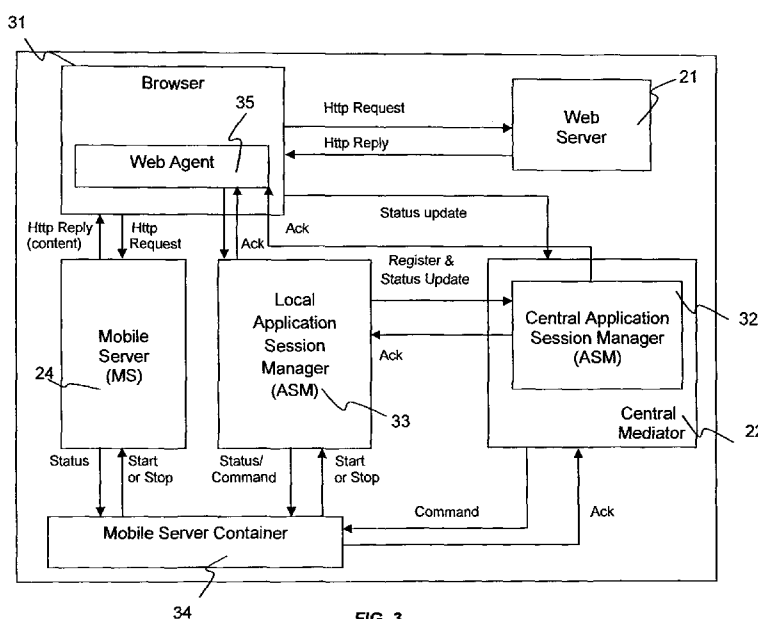


FIG. 3

(57) **Abstract:** A system (20) for dynamically allocating an application session manager comprising: a web server (21) adapted to maintain and deliver web content; a web browser (31) adapted to request and receive said web content from said web server; a web agent (35) associated with said web browser (31); a mobile server container (34) adapted to execute and maintain a plurality of mobile servers; a central application session manager (32) in communication with said web agent (35) and said mobile server container (34) and adapted to monitor client registration; a local application session manager (33) in communication with said web agent (35) and said mobile server container (34) and adapted to monitor local network conditions and client registration; and at least one mobile server (24) in communication with said web browser (31) and adapted to serve clients in the local network; characterised in that: said central application session manager (32) is adapted to manage the allocation of said local application session manager (33) in said local network; said local application session manager (33) operates as a Local Mediator is adapted to manage

allocation of said mobile server (24) in said local network, instruct said mobile server container (34) to initiate said mobile server (24) in said local network, and instruct said web agent (35) to perform redirection of clients within said local network, said local application session manager (33) undertakes most tasks from the central application session manager in the network; and said web agent (35) is adapted to register sessions, update activity and/or status of said sessions to said central application session manager (32) and said local application session manager (33) and perform redirection of clients within said local network.



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**SYSTEM AND METHOD FOR DYNAMICALLY ALLOCATING AN APPLICATION****SESSION MANAGER AT RUNTIME****FIELD OF INVENTION**

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The present invention relates to a system and method for dynamically allocating an Application Session Manager (ASM) at runtime. In particular, the invention relates to a system and method whereby an ASM is allocated to facilitate server allocation and client redirection thereby reducing Wide Area Network (WAN) traffic.

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**BACKGROUND ART**

Current mobile server systems generally involve management of allocation and client redirection over a WAN. Such systems (10), as illustrated in Figure 1, are inefficient because a central mediator (11) acting as the ASM needs to manage a large number of clients (12) over the WAN (13). Therefore, the amount of traffic over the WAN (13) can be unmanageable or excessively high.

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A system for chunked downloads over a Content Delivery Network is described in US2011/0055312 A1. In this system, a file is downloaded from a CDN in a series of byte ranges or chunks collectively making up the entire file. A client computer can request a file from a CDN by first requesting a server address, from a Domain Name Server (DNS), which can facilitate the downloading of a file in chunks, by returning more than one server to service the download request. Alternatively, the DNS server can instruct the client to request each byte range of the file individually from the DNS server so that it can individually direct the request to the most preferred server. Alternatively, the server returned by the DNS can redirect requests for a series of ranges to other servers to service the series of byte ranges simultaneously. As such, the system provides for delivery of content and/or applications from server to clients, but does not provide for dynamic allocation of a middle object (i.e. a local ASM) to manage local client management sessions (i.e. status updates and acknowledgement

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message flow). This system also does not consider local client redirection to a new Mobile Server (MS) allocated by the local ASM.

5 A system for synchronizing applications between devices is disclosed in US2010/0312817. The methodology includes displaying, on a sharing device, a list of one or more applications which are available to share with other devices, and receiving a selection, at the sharing device, of an application to share with a receiving device from the list of applications. Sharing preferences of the selected application are then determined and an application package created at the sharing device, based on  
10 the sharing preferences. A network connection is then established from the sharing device to the receiving device. The system transmits the application package from the sharing device to the receiving device via the network connection. As with the previously described system, this system does not provide allocation of the middle object (i.e. local ASM or MS) and does not include local client redirection to the newly  
15 allocated MS.

International Publication WO 2011/102709 describes a method for automated cluster head mechanism in multicast communication over a multi-cluster wireless network. The method involves designating, by an Enterprise Gateway, a best ranking client  
20 from a plurality of clients in a cluster of the multi-cluster wireless network, as a Cluster Head, announcing the Cluster Head, by the Enterprise Gateway, to the plurality of clients in the cluster, and assigning to the cluster, by the Enterprise Gateway, subscription of new clients of the multi-cluster wireless network. The method further comprises the Cluster Head notifying the Enterprise Gateway once a maximum  
25 capacity is achieved and receiving, by the Enterprise Gateway, direct subscription of new client of the multi-cluster wireless network. Again, this system does not provide allocation of the middle object (i.e. local ASM or MS) and does not include local client redirection to the newly allocated MS.

30 The subject matter claimed herein is not limited to embodiments that solve any disadvantages or that operate only in environments such as those described above. Rather, this background is only provided to illustrate one exemplary technology area where some embodiments described herein may be practice.

## SUMMARY OF INVENTION

The present invention relates to a a system and method for dynamically allocating an Application Session Manager (ASM) at runtime. In particular, the invention relates to a system and method whereby an ASM is allocated to facilitate server allocation and client redirection thereby reducing Wide Area Network (WAN) traffic.

One aspect of the present invention provides a system for dynamically allocating an application session manager comprising:

- 10 a web server adapted to maintain and deliver web content;
  - a web browser adapted to request and receive the web content from the web server;
  - a web agent associated with the web browser;
  - a mobile server container adapted to execute and maintain a plurality of mobile servers;
  - 15 a central application session manager in communication with the web agent and the mobile server container and adapted to monitor client registration;
  - a local application session manager in communication with the web agent and the mobile server container and adapted to monitor local network conditions and client registration; and
  - 20 at least one mobile server in communication with the web browser and adapted to serve clients in the local network;
- characterised in that:
- the central application session manager is adapted to manage the allocation of
  - 25 the local application session manager in the local network;
  - the local application session manager is adapted to manage allocation of the mobile server in the local network, instruct the mobile server container to initiate the mobile server in the local network, and instruct the web agent to perform redirection of clients within the local network; and
  - 30 the web agent is adapted to register sessions, update activity and/or status of the sessions to the central application session manager and the local application session manager and perform redirection of clients within the local network.

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Another aspect of the invention provides a method for dynamically allocating a local application session manager comprising:

executing a central application session manager to perform the allocation of a local application session manager in a local network; and

5        executing the local application session manager to perform the allocation of a mobile server in the local network.

A further aspect of the invention provides a method wherein the central application session manager performs allocation of the local application session manager on the  
10        basis of client and/or network information received from a web agent registered to the central application session manager.

Yet another aspect of the invention provides a method wherein the allocation of the local application session manager comprises:

15        the central application session manager checking the number of browser registrations;

if the number of browser registrations exceeds a predetermined threshold value, the central application session manager instructing a mobile server container for the local network to download the local application session manager;

20        the mobile server container downloading the local application session manager from a secure source;

the mobile server container initiating the local application session manager,

the local application session manager registering with the central application session manager; and

25        the central application session manager instructing web agents within the local network to register with the local application session manager.

Another aspect of the invention provides a method wherein if the number of browser registrations does not exceed the predetermined threshold value, the central application  
30        session manager continues to check the number of browser registrations.

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In a further aspect the invention provides a method wherein following execution of the local application session manager, the local application session manager starts collecting local network statistics.

- 5 In still another aspect the invention provides a method wherein the allocation of the mobile server comprises:

the local application session manager checking existing bandwidth utilisation and the number of browser registrations;

- 10 if the number of browser registrations exceeds a predetermined threshold value, the local application session manager checking the type of application required;

if the bandwidth utilisation is above a predetermined threshold value and/or registered browsers are running real-time applications the local application session manager instructing a mobile server container to download a mobile server;

- 15 the mobile server container downloading the mobile server from a secure source;  
the mobile server container initiating the mobile server;  
the mobile server registering with the local application session manager; and  
the local application session manager instructing web agents within the local network to connect to the mobile server.

- 20 In another aspect the invention provides a method wherein if the number of browser registrations does not exceed the predetermined threshold value, the local application session manager continues to check the bandwidth utilisation and the number of browser registrations.

- 25 In a further aspect the invention provides a method wherein if the bandwidth utilisation is below the predetermined threshold value and/or registered browsers are not running real-time applications the local application session manager continues to check the bandwidth utilisation and the number of browser registrations.

- 30 In yet another aspect the invention provides a method wherein the method additional comprises executing the local application session manager to terminate the mobile server.

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In another aspect the invention provides a method wherein the termination of the mobile server comprises:

the local application session manager determining whether the number of browser registrations is greater than zero;

5 if there are no browser registrations identified, the local application session manager instructing the web agent to report to the central application session manager;

the local application session manager terminating the mobile server and deregistering itself from the central application session manager and a mobile server container associated with the local application session manager; and

10 the local application session manager exiting from execution.

In a further aspect the invention provides a method wherein if the number of browser registrations is greater than zero, the web agent sends status information to the local application session manager and the local application session manager sends the status

15 information to the central application session manager.

The present invention consists of features and a combination of parts hereinafter fully described and illustrated in the accompanying drawings, it being understood that various changes in the details may be made without departing from the scope of the invention or

20 sacrificing any of the advantages of the present invention.



**BRIEF DESCRIPTION OF ACCOMPANYING DRAWINGS**

To further clarify various aspects of some embodiments of the present invention, a more particular description of the invention will be rendered by references to specific  
5   embodiments thereof, which are illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail through the accompanying drawings in which:

10   FIG. 1 illustrates a general prior art system.

FIG. 2 illustrates a general system in accordance with the invention.

FIG. 3 illustrates system architecture of an embodiment of the system of the invention.

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FIG. 4 illustrates a flowchart of an embodiment of the method of the invention.

FIG. 5 illustrates a flowchart of local ASM allocation.

20   FIG. 6 illustrates a flowchart of mobile server allocation.

FIG. 7 illustrates a flowchart of local ASM and mobile server termination.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a system and method for dynamically allocating an Application Session Manager (ASM) at runtime. In particular, the invention relates to a system and method whereby an ASM is allocated to facilitate server allocation and client redirection thereby reducing Wide Area Network (WAN) traffic.

Referring to Figure 2, the system (20) of the invention is generally illustrated. The system (20) includes a web server (21) for maintaining and delivering web contents to a web browser, described in more detail with reference to Figure 3. A central mediator (22) is provided that monitors client registration and that is responsible for allocation of a local mediator (23). In turn, the local mediator (23) monitors the network conditions and client registrations and allocates a mobile server (24) for executing server functionality in or near the client network (25), such as a Local Area Network (LAN), serving a plurality of clients (26). The architecture of the system is more particularly illustrated in Figure 3.

Turning to Figure 3, the architecture of the system (20) of an embodiment the invention is illustrated. A web server (21) maintains and delivers web content or services to a web browser (31), which likewise requests and receives such content or services from the web server (21). A central mediator (22), which is generally adapted to maintain and interact with a plurality of web agents and mobile server containers, includes a central ASM (32). The central ASM (32) monitors client registration and determines and manages the allocation, execution and maintenance of at least one local ASM (33).

The local ASM (33), also discussed above as a local mediator (23), monitors local network conditions and client registration. The local ASM (33) is in communication with a mobile server container (34) and a web agent (35) within the web browser (31) and, based on network conditions and client registration, allocates a mobile server (24) to serve the clients (26). In particular, the local ASM (33) instructs the mobile server container (34) and web agent (35) to download the mobile server (24) and perform redirection of the clients (26) respectively. The mobile server (24) executes server functionality in or near the client network. The local application session manager (33) undertakes most tasks from the central ASM residing in the network.

The web agent (35) performs the functions of registering sessions, updating activity or status of the application session to both the central ASM (32) and the local ASM (33), and also performs redirection of clients (26), as discussed above. The mobile server container (34) performs the functions of downloading, executing and maintaining a plurality of mobile servers (24).

The methodology of an embodiment of the invention is illustrated generally in Figure 4. The method (40) involves initial communication (41) of the browser (31) with the web server (21). The web server (21) replies (42) to the browser (31) with relevant content and the web agent (35). The web agent (35) performs registration (43) to the central ASM (32) and provides both client and network information, including for example ID, ToA, IP address, Gateway IP, Trace Route and Content URL, to the central ASM (32).

On the basis of the information received, the central ASM (32) performs allocation (44) of a local ASM (33) on a designated mobile server container (34). The local ASM (33) then performs allocation (45) of a mobile server (24) on the designated mobile server container (34) based on network conditions and client registration information.

In a final stage, in the event there are no remaining browser registrations, the local ASM (33) performs termination (46) of the mobile server (24) and its own execution.

Figure 5 illustrates the step of allocation (44) of the local ASM (33) in more detail. Initially the central ASM (32) checks the number of browser registrations (441). If the central ASM (32) identifies (442) that there are less than a predetermined number of browser registrations from the same network, the process is repeated. However, if the central ASM (32) identifies (442) that there are greater than a predetermined number of browser registrations in a network, the central ASM (32) instructs (443) the mobile server container (34) in that network to download a local ASM (33). The mobile server container (34) then downloads (444) the local ASM (33) from a given secure FTP source.

Once the local ASM (33) is downloaded, the mobile server container (34) initiates (445) the local ASM (33). The local ASM (33) then registers (446) with the central ASM (32) and the central ASM (32) instructs all agents in the same network to register (447) with

- 10 -

the local ASM (33). The local ASM (33) may then start collecting network statistics (448), such as bandwidth utilisation and so on.

Turning to Figure 6, the step of allocation (45) of the mobile server (24) is illustrated in more detail. Initially, the local ASM (33) checks the existing bandwidth utilisation (451) and checks the number of browser registrations (452). If the number of browser registrations is below a predetermined threshold value, the process is repeated. If the number of browser registrations is above the predetermined threshold value, the local ASM (33) checks the type of application required (453).

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The local ASM (33) then determines (454) whether or not the registered browsers are running real-time applications, or the bandwidth utilisation is below a predetermined threshold value. If the registered browsers are not running real-time applications, or the bandwidth utilisation is below a predetermined threshold value, the local ASM (33) continues to check both the current bandwidth and the number of browser registrations. Otherwise, the local AMS (33) instructs the mobile server container (34) to download (455) a specific application mobile server (24). The mobile server container (34) then downloads (456) the application mobile server (24) from a given FTP source and starts (457) the application mobile server (24).

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Once initiated, the application mobile server (24) registers (458) with the local ASM (33). The local ASM (33) then informs (459) all registered web agents (35) in the same network to reconnect to the newly allocated application mobile server (24).

25 The termination (46) of the mobile server (24) and local ASM (33) is illustrated in more detail in Figure 7. Initially a determination (461) is made as to whether the number of browser registrations is greater than zero. If so, the web agent (35) sends status information (462) to the local ASM (33) and the local ASM (33) sends the status information (463) to the central ASM (32). If there are no browser registrations identified, the local ASM (33) instructs the web agent (35) to report back (464) to the central ASM (32). The local ASM (33) then terminates (465) the mobile server (24), deregisters itself (466) from the central ASM (32) and the mobile server container (34) and quits from execution (467).

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Hereinafter, this specification will describe the present invention according to the preferred embodiments. It is to be understood that limiting the description to the preferred embodiments of the invention is merely to facilitate discussion of the present invention and it is envisioned without departing from the scope of the appended claims.

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Unless the context requires otherwise or specifically stated to the contrary, integers, steps or elements of the invention recited herein as singular integers, steps or elements clearly encompass both singular and plural forms of the recited integers, steps or elements.

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Throughout this specification, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated step or element or integer or group of steps or elements or integers, but not the exclusion of any other step or element or integer or group of steps, elements or integers. Thus, in the context of this specification, the term "comprising" is used in an inclusive sense and thus should be understood as meaning "including principally, but not necessarily solely".

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It will be appreciated that the foregoing description has been given by way of illustrative example of the invention and that all such modifications and variations thereto as would be apparent to persons of skill in the art are deemed to fall within the broad scope and ambit of the invention as herein set forth.

**CLAIMS**

1. A system (20, 30) for dynamically allocating an application session manager comprising:

5           a web server (21) adapted to maintain and deliver web content;  
          a web browser (31) adapted to request and receive said web content from  
          said web server;  
          a web agent (35) associated with said web browser to register  
          sessions, update activity and/or status of said sessions to said  
10          central application session manager and said local application session  
          manager and perform redirection of clients within said local network;  
          a mobile server container (24) adapted to execute and maintain a plurality  
          of mobile servers;  
          a central application session manager (32) in communication with said  
15          web agent and said mobile server container and adapted to  
          monitor client registration, to manage the allocation of local application  
          session manager in said local network on the basis of client and/or  
          network information received from a web agent registered to said central  
          application session manager;  
20          a local application session manager (33) in communication with said web  
          agent and said mobile server container and adapted to monitor local  
          network conditions and client registration; and  
          at least one mobile server (24) in communication with said web browser  
          (31) and adapted to serve clients in the local network  
25          characterised in that:  
          said local application session manager (33) operates as a Local Mediator  
          is adapted to manage allocation of said mobile server in said local  
          network, instruct said mobile server container to initiate said mobile  
          server in said local network, and instruct said web agent to perform  
30          redirection of clients within said local network; said local application  
          session manager (33) undertakes most tasks from the central application  
          session manager in the network.

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2. A method (40) for dynamically allocating a local application session manager comprising:

executing a central application session manager to perform the allocation of a local application session manager in a local network (44);

5 executing said local application session manager to perform the allocation of a mobile server in said local network (45); and

executing said local application session manager to terminate said mobile server (46)

characterised in that

10 executing said local application session manager to perform the allocation of a mobile server in said local network (45) further comprises steps of:

the local application session manager checking existing bandwidth utilisation and the number of browser registrations (451, 452);

15 if the number of browser registrations exceeds a predetermined threshold value, said local application session manager checking the type of application required (453);

if the bandwidth utilisation is above a predetermined threshold value and/or registered browsers are running real-time

20 applications said local application session manager instructing a mobile server container to download a mobile server (455);

the mobile server container downloading said mobile server from a secure source (456);

the mobile server container initiating said mobile server (457);

25 the mobile server registering with said local application session manager (458); and

the local application session manager instructing web agents within said local network to connect to the mobile server (459).

3. A method (44) according to claim 2, wherein said allocation of said local application session manager comprises:

30 the central application session manager checking the number of browser registrations (441);

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if the number of browser registrations exceeds a predetermined threshold value, said central application session manager instructing a mobile server container for said local network to download said local application session manager (442);

5 the mobile server container downloading said local application session manager from a secure source (443, 444);

the mobile server container initiating said local application session manager (445);

10 the local application session manager registering with said central application session manager (446);

the central application session manager instructing web agents within said local network to register with said local application session manager (447); and

15 the local application session manager starts collecting local network statistics (448).

4. A method according to claim 3, wherein if the number of browser registrations does not exceed said predetermined threshold value, said central application session manager continues to check said number of browser registrations.

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5. A method according to claim 2, wherein if the number of browser registrations does not exceed said predetermined threshold value, said local application session manager continues to check said bandwidth utilisation and said number of browser registrations.

25

6. A method according to claim 2, wherein if the bandwidth utilisation is below said predetermined threshold value and/or registered browsers are not running real-time applications said local application session manager continues to check said bandwidth utilisation and said number of browser registrations.

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7. A method according to any of claims 2 to 6, wherein said method additional comprises executing said local application session manager to terminate said mobile server.



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8. A method (46) according to claim 2, wherein said termination of said mobile server comprises:

the local application session manager determining whether the number of browser registrations is greater than zero (461);

5 if there are no browser registrations identified, said local application session manager instructing said web agent to report to said central application session manager (464);

10 said local application session manager terminating said mobile server and deregistering itself from said central application session manager and a mobile server container associated with said local application session manager (466); and

said local application session manager exiting from execution (467).

- 15 9. A method according to claim 7, wherein if the number of browser registrations is greater than zero, said web agent sends status information to said local application session manager (462) and said local application session manager sends said status information to said central application session manager (463).

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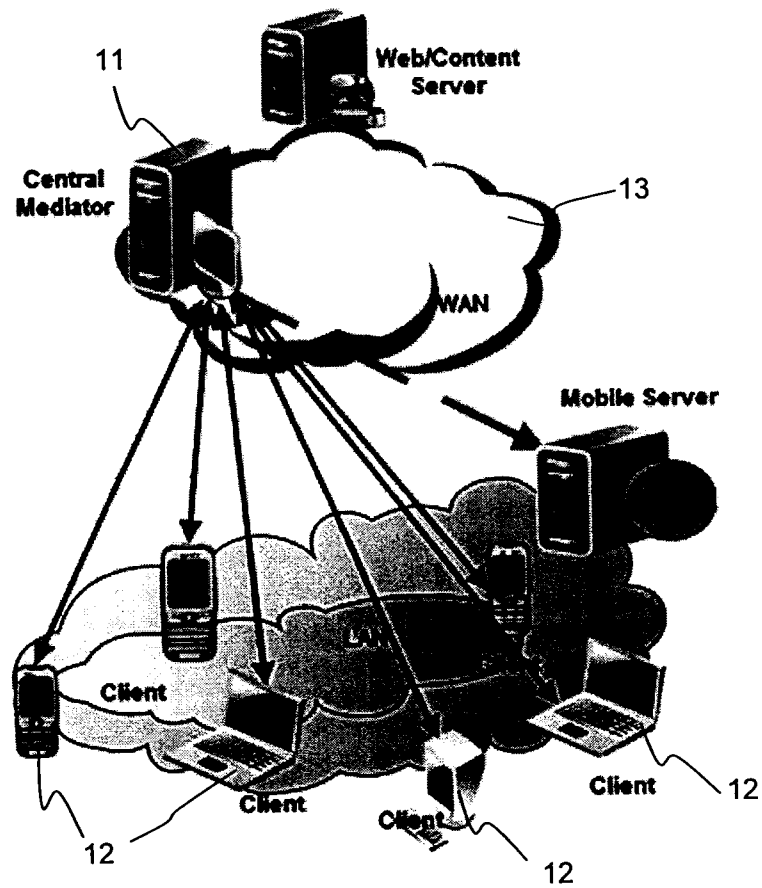


FIG. 1

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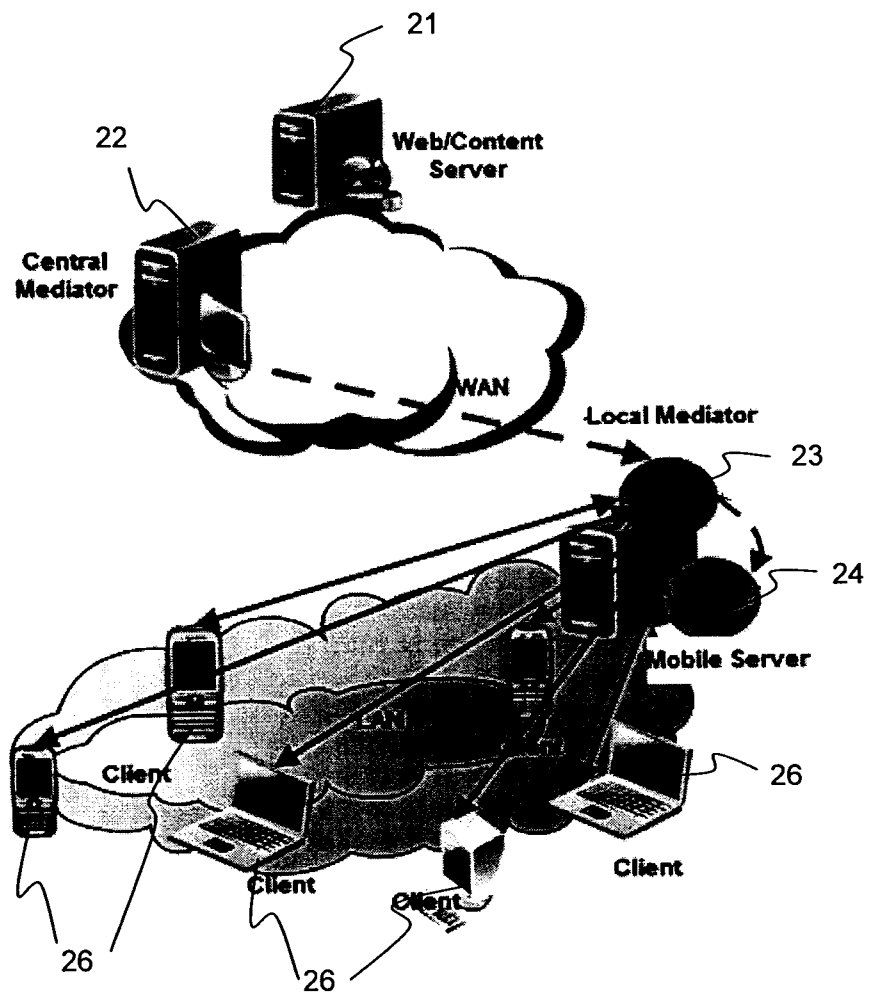
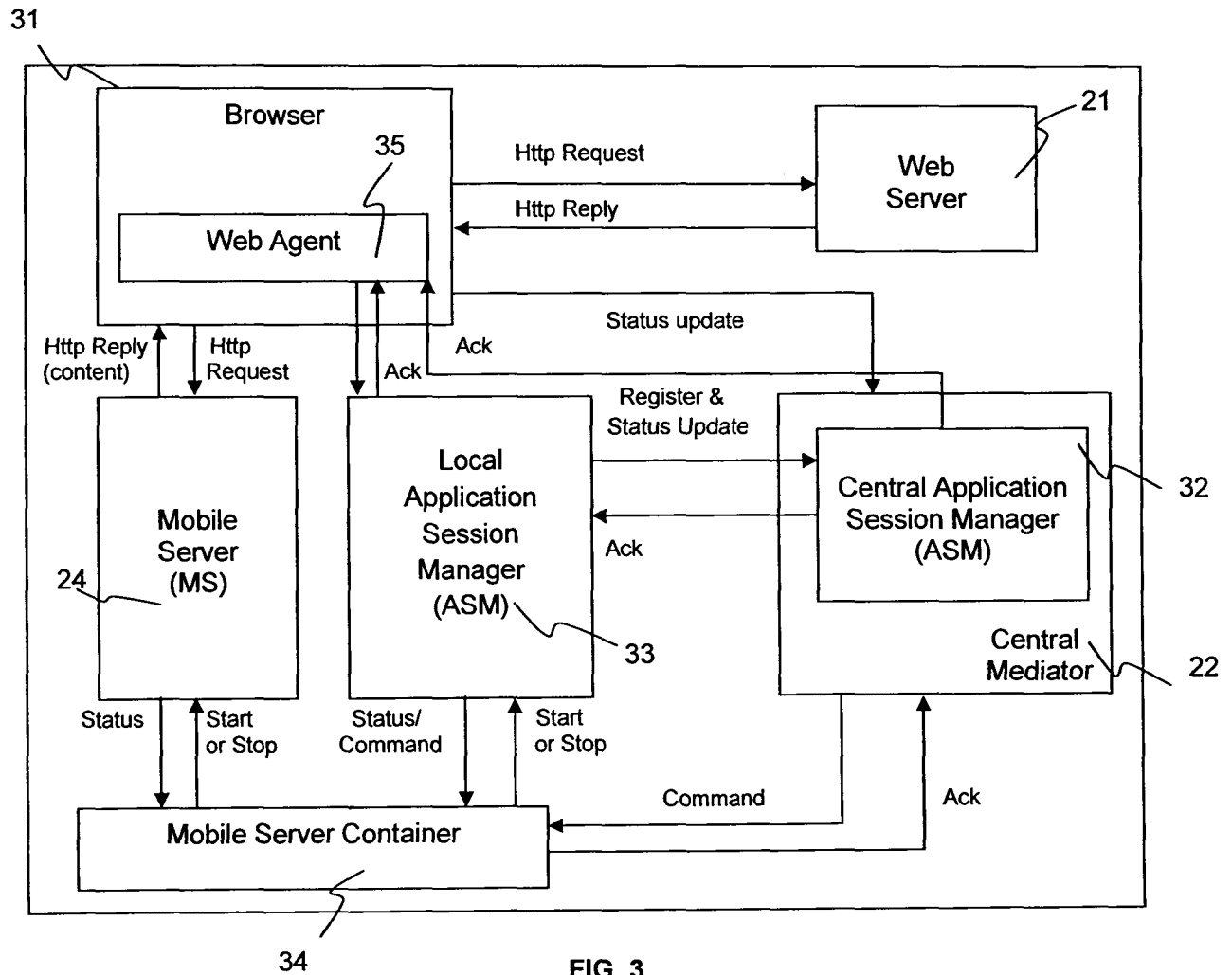


FIG. 2

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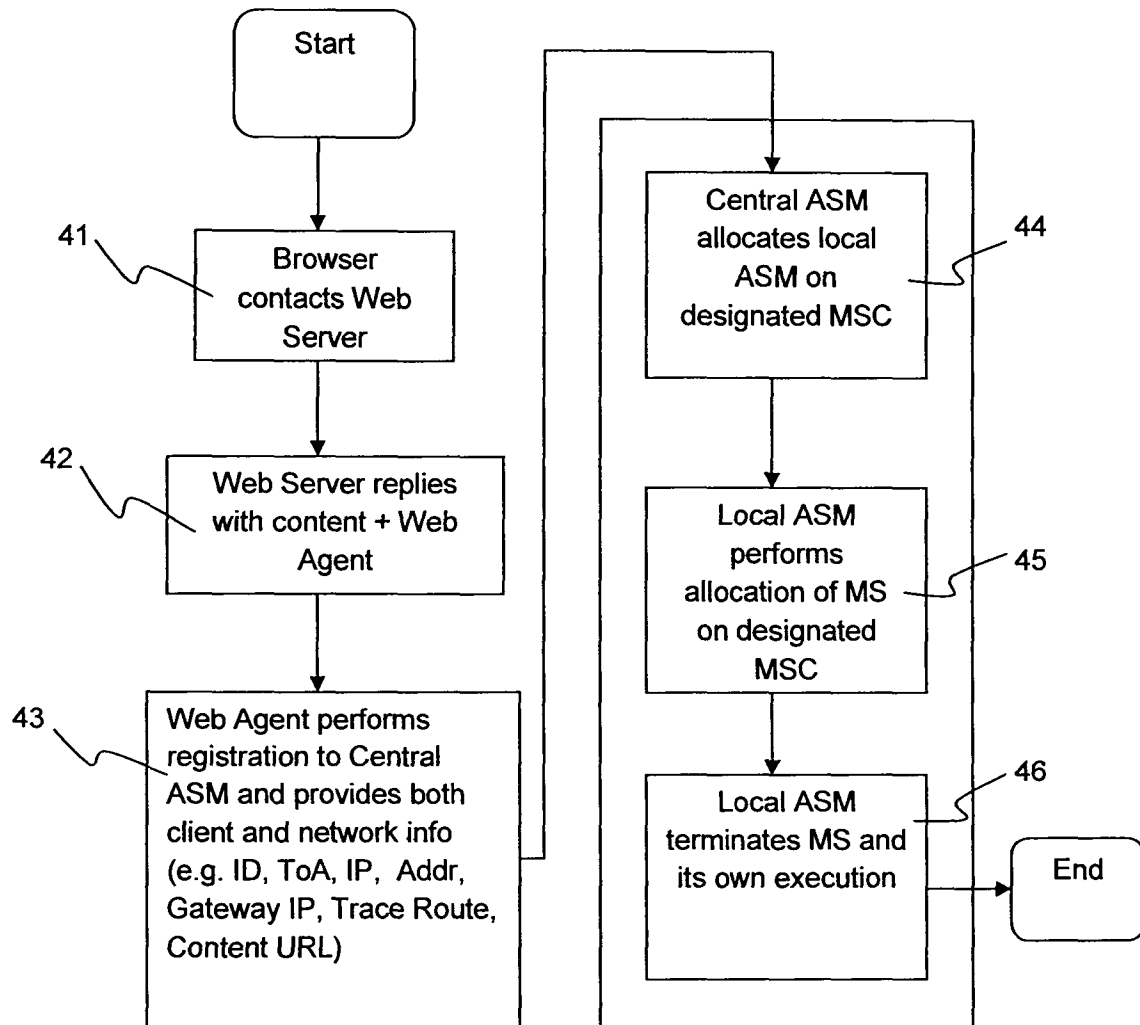


FIG. 4

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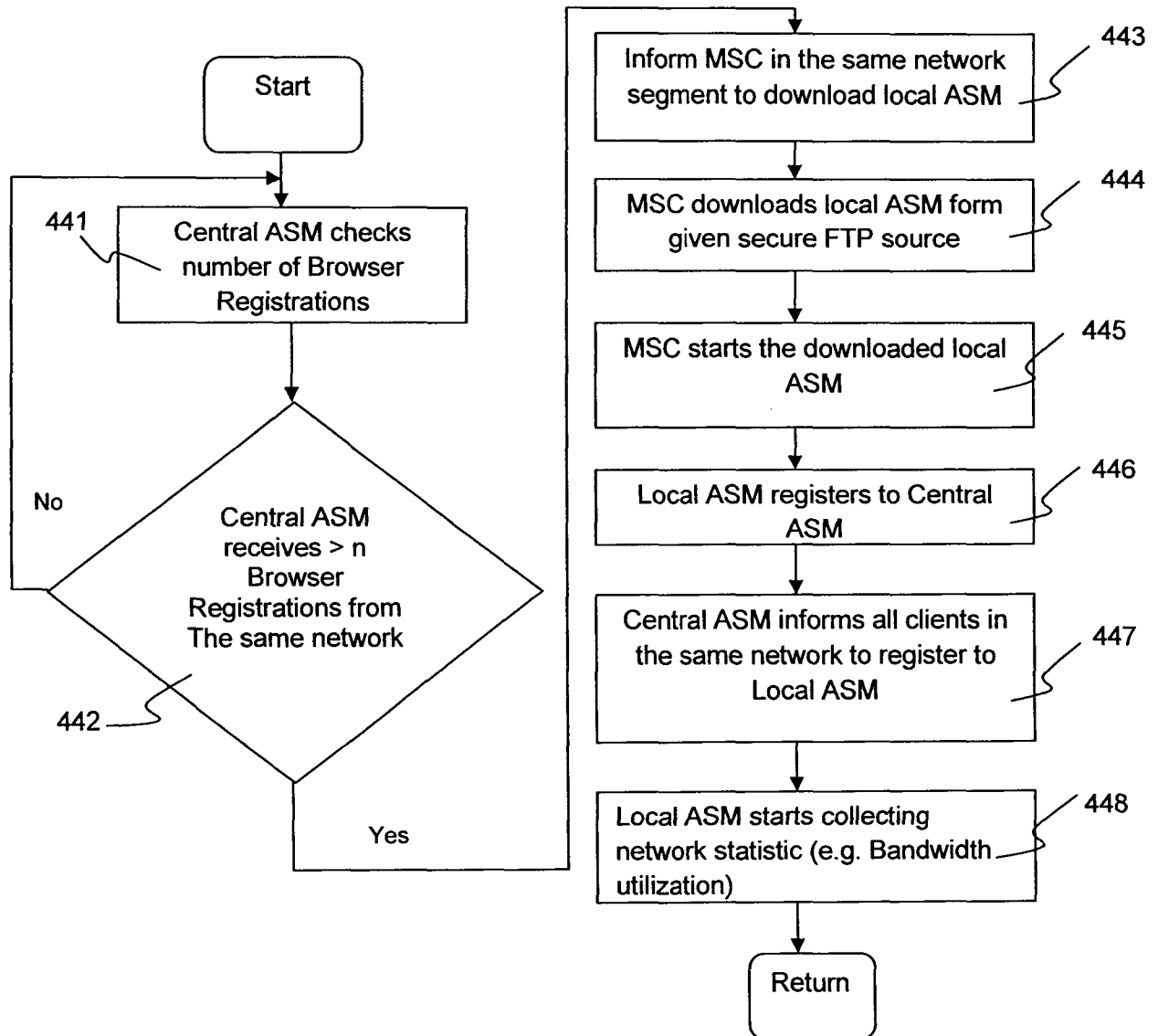


FIG. 5

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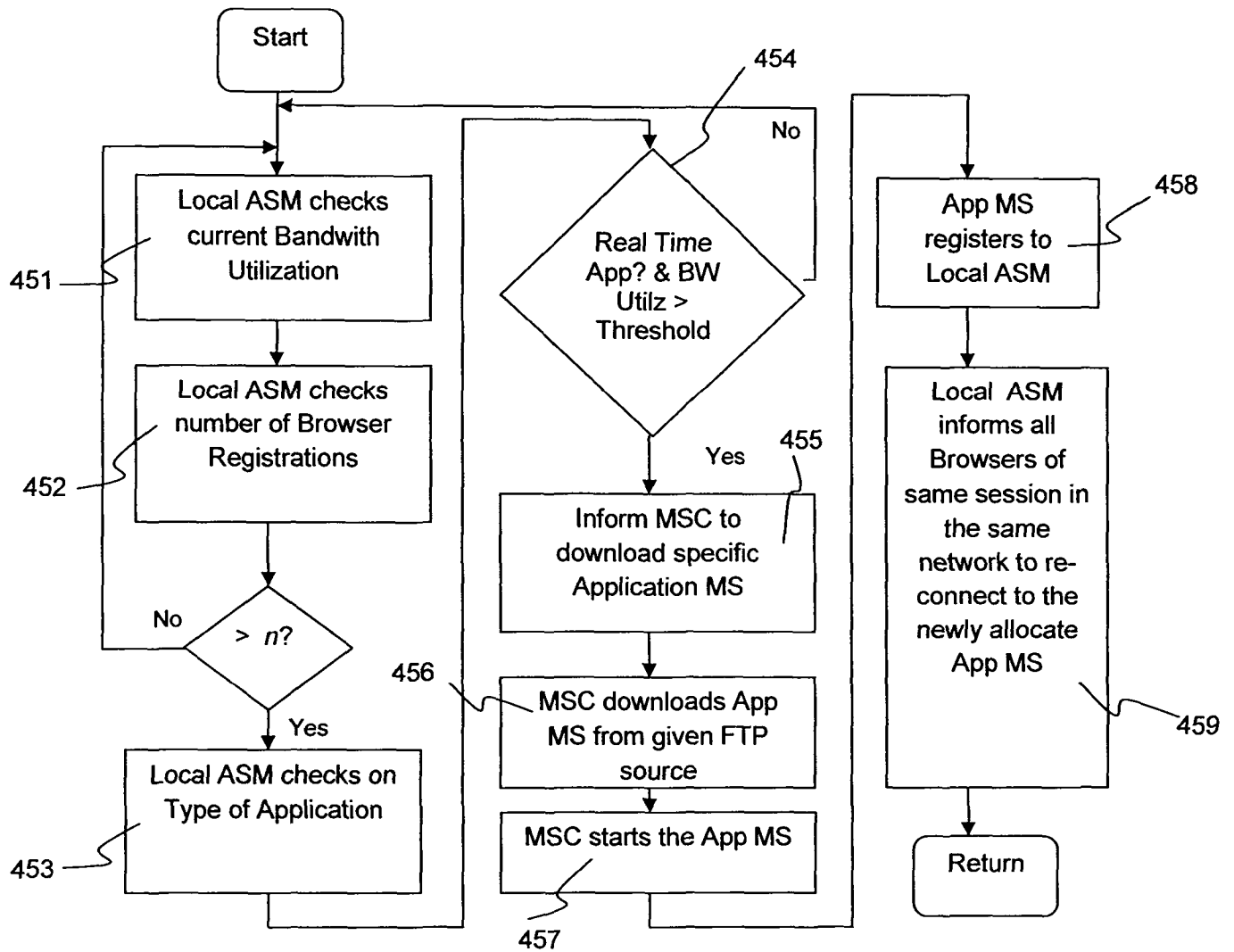


FIG. 6

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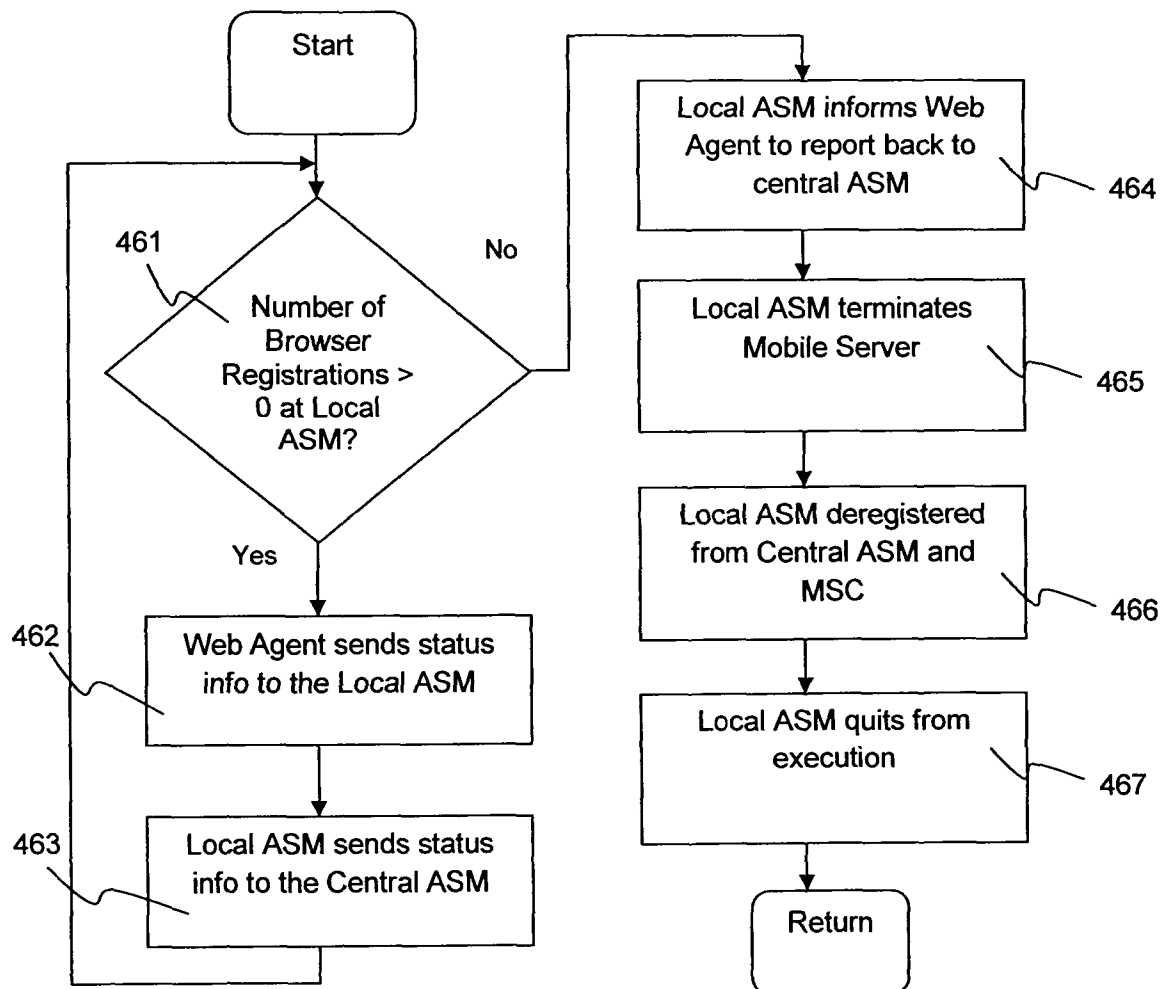


FIG. 7



## INTERNATIONAL SEARCH REPORT

International application No  
PCT/MY2013/000232

A. CLASSIFICATION OF SUBJECT MATTER  
INV. H04L29/08  
ADD. G06F9/50

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 G06F

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 practicable, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                         | Relevant to claim No. |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | JAE WOO LEE ET AL: "NetServ: Active Networking 2.0", COMMUNICATIONS WORKSHOPS (ICC), 2011 IEEE INTERNATIONAL CONFERENCE ON, IEEE, 5 June 2011 (2011-06-05), pages 1-6, XP031909273, DOI: 10.1109/ICCW.2011.5963554 ISBN: 978-1-61284-954-6 | 1-7,9                 |
| A         | abstract; figures 1, 3<br>Section III<br>Section IV-A                                                                                                                                                                                      | 8                     |
| A         | US 7 660 896 B1 (DAVIS ANDREW T [US] ET AL) 9 February 2010 (2010-02-09)<br>abstract; figures 1, 3, 4<br>column 3, line 48 - column 4, line 45<br>column 5, line 66 - column 6, line 4<br>column 7, line 37 - line 52<br>-----<br>-/-      | 1-9                   |



Further documents are listed in the continuation of Box C.



See patent family annex.

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## INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                         | Relevant to claim No. |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A         | US 2003/187991 A1 (LIN RAYMOND [US] ET AL)<br>2 October 2003 (2003-10-02)<br>paragraph [0056] - paragraph [0060];<br>figures 1, 5<br>----- | 1-9                   |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date         |
|-------------------------------------------|---------------------|----------------------------|-----------------------------|
| US 7660896                                | B1                  | 09-02-2010                 | US 7660896 B1 09-02-2010    |
|                                           |                     |                            | US 2010138542 A1 03-06-2010 |
|                                           |                     |                            | US 2012166650 A1 28-06-2012 |
|                                           |                     |                            | US 2013007282 A1 03-01-2013 |
| -----                                     |                     |                            |                             |
| US 2003187991                             | A1                  | 02-10-2003                 | NONE                        |
| -----                                     |                     |                            |                             |