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(71) Applicant (for all designated States except US): **TEK-ELEC** [US/US]; 5200 Paramount Parkway, Morrisville, NC 27560 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SPARKS, Robert, J.** [US/US]; 1613 Lake Crest Lane, Plano, TX 75023 (US). **ROACH, Adam, B.** [US/US]; 9340 Briarhurst Dr,

Dallas, TX 75243 (US). **CAMPBELL, Ben, Allen** [US/US]; 204 Touchdown Dr., Irving, TX 75063 (US). **DEO, Ajay, P.** [IN/US]; 2508 Sir Tristram Lane, Lewisville, TX 75056 (US).

(74) Agent: **HUNT, Gregory, A.**; Jenkins, Wilson, Taylor & Hunt, P.A., Suite 1200, University Tower, 3100 Tower Boulevard, Durham, NC 27707 (US).

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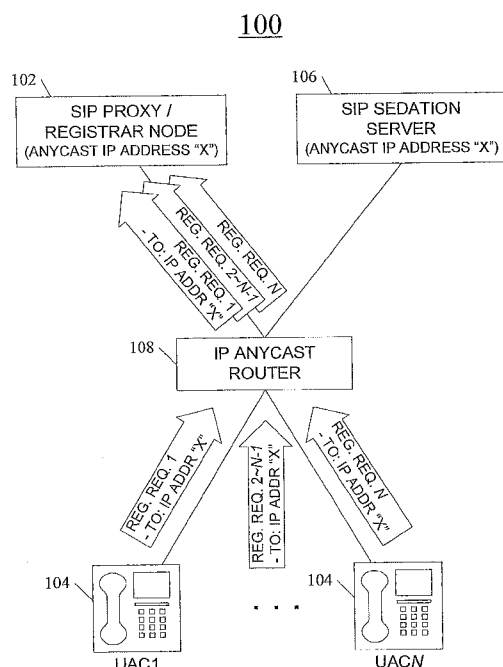


FIG. 1A

(57) Abstract: Methods, systems, and computer readable media for providing sedation service in a telecommunications network are disclosed. According to one aspect, a method for providing sedation service in a telecommunications network is provided. The method includes steps that are performed at a session initiation protocol (SIP) sedation node. The method includes receiving a first message sent from a SIP user agent and intended for a SIP server. The method further includes determining whether the SIP server is unavailable. The method further includes responsive to a determination that the SIP server is unavailable to respond to the first message, sending, to the SIP client, a SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.



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DESCRIPTION
METHODS, SYSTEMS, AND COMPUTER READABLE MEDIA FOR
PROVIDING SEDATION SERVICE IN A TELECOMMUNICATIONS
NETWORK

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PRIORITY CLAIM

This application claims the benefit of U.S. Provisional Patent Application Serial No. 61/085,115, filed July 31, 2008; the disclosure of which is incorporated herein by reference in its entirety.

10

TECHNICAL FIELD

The subject matter described herein relates to methods and systems for managing traffic in a telecommunications network. More particularly, the subject matter described herein relates to methods, systems, and computer readable media for providing sedation service in a telecommunications network.

BACKGROUND

As a result of the falling price and increasing power of computing systems, personal computers are becoming ubiquitous. With increased access to the Internet, the number of users or subscribers to telecommunication networks has also increased. As the size and weight of computing systems rapidly decrease, there has been an enormous increase in the number of mobile computing platforms, such as smart phones, personal digital assistants (PDAs), and the like. As a result of this explosive growth in numbers of personal computers and mobile computing platforms, telecommunications network providers have seen an increase in the number of subscribers to the network.

In addition to the increase in the number of subscribers to telecommunications networks, there has also been an increase in the number of services available to these subscribers. Example services include presence service, email, voice mail, caller ID, and others. As the number of services increases, and the number of subscribers to those services also increases, it becomes economically efficient for a telecommunications service provider to

create a node or network entity that is dedicated to providing a particular service, rather than having every node in the network provide that service. For example, in a network that uses the session initiation protocol (SIP) to establish media sessions between two nodes in the network, a network provider may set up a node within the network as a SIP proxy / registrar node, to which all SIP user agent clients (UACs) in the network will send SIP registration messages.

There are disadvantages associated with this approach, however. If a service-providing node fails, this may cause an increase in message traffic from the service clients. For example, if the SIP proxy / registrar node described above, fails, the UACs will attempt to re-establish their sessions by issuing registration requests. If a network has a large number of subscribers, this may result in a flood of messages across the network, which may drive the network into a congested state. In addition, if and when the failing node recovers, the flood of messages directed to the node may overwhelm the node, causing further congestion and potentially causing the node to fail again. Even if the node continues to operate, it will attempt to respond to all of the messages received, effectively doubling the amount of traffic on an already congested network. The situation is worsened if the protocol used allows multiple reconnection retries – the increase in congestion may continue indefinitely, until the node recovers and has a chance to respond to all queries.

Accordingly, in light of these disadvantages associated with conventional network configurations, there exists a need for methods, systems, and computer readable media for providing sedation service in a telecommunications network.

SUMMARY

Methods, systems, and computer readable media for providing sedation service in a telecommunications network are disclosed. According to one aspect, a method for providing sedation service in a telecommunications network is provided. The method includes steps that are performed at a session initiation protocol (SIP) sedation node. The method includes receiving a first message sent from a SIP user agent and intended for a SIP server. The method further includes determining whether the SIP server is unavailable.

The method further includes responsive to a determination that the SIP server is unavailable to respond to the first message, sending, to the SIP user agent, a SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.

5 According to another aspect of the subject matter described herein, a method for providing sedation service in a telecommunications network is provided. The method includes steps that are performed at a SIP sedation node. The method includes, in response to a SIP server becoming unavailable, receiving a first message sent from a SIP user agent that is intended for the
10 SIP server. The method further includes, in response to receiving the first message, sending, to the SIP user agent, a SIP sedation message for reducing the number or frequency of messages sent by the user agent to the SIP server.

 According to yet another aspect of the subject matter described herein, a system for providing sedation service in a telecommunications network is
15 provided. The system includes a session initiation protocol (SIP) sedation node that is configured for receiving a first message sent from a SIP user agent and intended for a SIP server. The sedation server is further configured for determining whether the SIP server is unavailable. The sedation server is further configured for, responsive to a determination that the SIP server is
20 unavailable to respond to the first message, sending, to the SIP user agent, a SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.

 According to yet another aspect of the subject matter described herein, a system for providing sedation service in a telecommunications network is
25 provided. The system includes a SIP sedation node that, in response to a SIP server becoming unavailable is configured for receiving a first message sent from a SIP user agent that is intended for the SIP server. The SIP sedation node is further configured for, in response to receiving the first message, sending, to the SIP user agent, a SIP sedation message for reducing the
30 number or frequency of messages sent by the SIP user agent to the SIP server.

The subject matter described herein for providing sedation service in a telecommunication network may be implemented in hardware, software,

firmware, or any combination thereof. As such, the terms “function” or “module” as used herein refer to hardware, software, and/or firmware for implementing the feature being described. In one exemplary implementation, the subject matter described herein may be implemented using a computer readable medium having stored thereon computer executable instructions that when executed by the processor of a computer control the computer to perform steps. Exemplary computer readable media suitable for implementing the subject matter described herein include disk memory devices, chip memory devices, programmable logic devices, and application specific integrated circuits. In addition, a computer readable medium that implements the subject matter described herein may be located on a single device or computing platform or may be distributed across multiple devices or computing platforms.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the subject matter described herein will now be explained with reference to the accompanying drawings, wherein like reference numerals represent like parts, of which:

Figures 1A~C are block diagrams illustrating an exemplary system for providing a sedation service in a telecommunications network according to an embodiment of the subject matter described herein;

Figures 2A~C are block diagrams illustrating an exemplary system for providing a sedation service in a telecommunications network according to another embodiment of the subject matter described herein; and

Figure 3 is a flow chart illustrating an exemplary process providing sedation service in a telecommunications network according to an embodiment of the subject matter described herein.

DETAILED DESCRIPTION

In accordance with the subject matter disclosed herein, methods, systems, and computer readable media are provided for providing sedation service during transient events in a telecommunications network. In one embodiment, a sedation server acts on behalf of an unavailable SIP server by receiving messages that are sent by sending user agents to the unavailable target node. In response, the sedation server sends to the user agents

messages designed reduce the number and/or the frequency of messages sent by the sending user agents to the target SIP server. The messages sent by the sedation server to the sending user agents may specify an amount of time that the sending user agents must wait before it can send another message to the target node.

Figures 1A~C are block diagrams illustrating an exemplary system for providing a sedation service in a telecommunications network according to an embodiment of the subject matter described herein. In one embodiment, system **100** may include a first node in a telecommunications network that responds to messages received from a second node in the network. For example, in the embodiment illustrated in Figures 1A~C, system **100** includes a SIP proxy / registrar node, SIP proxy **102**, that responds to SIP registration requests from one or more user agents, such as SIP user agent clients UAC1 through UACN, collectively referred to as UACs **104**, although other user agents, such as SIP user agent servers or non-SIP user agents, are also contemplated. The first node may be a node that provides a network service in the telecommunications network. In the embodiments illustrated in Figures 1A~C, the telecommunications network supports the SIP protocol, but the subject matter described herein is not so limited. Thus, the first node may be a SIP proxy server, a SIP registrar, a SIP user agent server, an Internet protocol multimedia subsystem (IMS) node, such as a call session control function (CSCF), a SIP or non-SIP presence server, and so on.

In one embodiment, system **100** may include a third node for sending sedation messages to the second node or nodes in response to unavailability of the first node. For example, in the embodiment illustrated in Figures 1A~C, system **100** includes a SIP sedation server **106** for sending sedation messages to UACs **104** in response to detection of a failure or other unavailability (for example, out of service due to maintenance or upgrading) of SIP proxy **102**. The sedation messages are designed to reduce the number of messages sent by the second node to the first node, the frequency of messages sent by the second node to the first node, or both the number and frequency of messages sent by the second node to the first node. In the embodiment illustrated in Figures 1A~C, SIP sedation server **106** sends sedation messages to UACs **104**

to reduce the number and/or frequency of messages that UACs **104** send to SIP proxy **102**.

In one embodiment, system **100** may include a router **108** for routing the requests from UACs **104** to SIP proxy **102**. In the embodiment illustrated in
5 Figures 1A~C, router **108** is an anycast router, and both SIP proxy **102** and SIP sedation server **106** are configured to have the same anycast address, IP address "X". As used herein, the term "anycast address" refers to an identifier for a set of interfaces, typically belonging to different nodes. A packet sent to an anycast address is delivered to one of the interfaces identified by that
10 address, i.e., the "nearest" one, according to the routing protocol's measure of distance. In the embodiment illustrated in Figure 1A, a UAC **104** seeking to register a SIP session may issue a SIP registration request to anycast address "X", which is the address that has been assigned to the SIP registration function. Router **108** intercepts these SIP registration requests and forwards
15 them to the "nearest" node associated with that anycast address, e.g., SIP proxy **102**.

An example operation of system **100** is illustrated in more detail in Figures 1B and 1C. In the embodiment illustrated in Figure 1B, SIP proxy **102** is unavailable, due to a failure of the node itself or of a communication link to
20 the node, for example. Router **108** detects the failure of SIP proxy **102** and, in response, redirects all messages that were intended for SIP proxy **102** to another node associated with the Anycast address "X". In one embodiment, system **100** may have one or more redundant SIP proxies. In this scenario, anycast router **108** may choose the next nearest node associated with anycast
25 address "X", i.e., one of the backup SIP proxies. In such a configuration, SIP sedation server would be configured so that it always appears as the "farthest" node to anycast router **108**, so that messages will be redirected to SIP sedation server **106** only if all SIP proxies **102** and their redundant backups have failed. In the embodiment illustrated in Figure 1B, router **108** redirects all SIP
30 registration requests to SIP sedation server **106**.

Figure 1C illustrates the response of SIP sedation server **106** to messages received, such as the SIP registration request messages illustrated in Figure 1B. SIP sedation server **106** issues a sedation message in response

to each of the SIP registration requests received. In other embodiments, SIP sedation server **106** may issue sedation messages in response to other types of SIP messages, including SIP registration requests, SIP subscribe requests, and SIP invite requests. The subject matter described herein is not constrained to embodiments that use SIP. For example, in alternative embodiments, sedation messages may be sent by a non-SIP sedation server, in response to receiving non-SIP messages, including non-SIP registration, subscription, or invitation messages.

In the embodiment illustrated in Figure 1C, SIP sedation server **106** issues SIP 5XX response messages, which are used to indicate a SIP server error. Other sedation messages that may be sent by SIP sedation server **106** include messages to indicate a process in progress, such as SIP 1XX messages. In one embodiment, the sedation messages may include a "retry after" parameter, which is used to instruct the UAC **104** to wait a specified amount of time before retrying the request.

In one embodiment, SIP sedation server **106** may manipulate the retry after parameters for the purpose of preventing UACs **104** from overwhelming SIP proxy **102** with a flood of requests that occur at the same or nearly the same time. For example, as SIP sedation server **106** issues the SIP 5XX responses to UAC1 through UAC *N*, SIP sedation server **106** may set the retry parameter *T* to a progressively increasing value, such that UAC1 is instructed to wait 1 second before attempting to register again, UAC2 is instructed to wait 2 seconds, UAC3 is instructed to wait 3 seconds, and so on. The delay values are for illustrative purposes only: values in the microseconds, milliseconds, minutes, hours, etc., may be more appropriate, depending on the service provided by the failed node, the nature of the node outage, and so on. Alternatively, the specified delay may be the same for every sedation message; the delay may be based on the class of the particular UAC, in which premium clients are instructed to wait less time than regular clients; the delay may be programmatically defined according a pertinent algorithm; the delay may be randomly assigned; and so on. By distributing the retry requests over time, the recovering node, e.g., SIP proxy **102**, may avoid being overwhelmed with a

flood of retry requests once it has recovered. In addition, temporal distribution of retry requests helps avoid network congestion.

Although Figures 1A~C illustrated an embodiment having SIP nodes **102** and **106** and UACs **104**, it will be appreciated that the sedation server concept is equally applicable to other networks, including circuit-switched and packet-switched networks, cellular or mobile networks, voice and/or data networks, networks based on Internet protocol (IP), IP multimedia subsystem (IMS) protocols, next-generation networks (NGN), and so on. The subject matter described herein is likewise not limited to SIP registration, but may be applied to network nodes that provide any kind of network service, including nodes that receive and process (and optionally, respond to) other types of messages. The sedation concept may also be applied to any protocol which supports messages which result in a calming of message traffic, e.g., which cause a sending node to send fewer messages, to send messages less frequently, etc., or to temporarily (or even permanently) stop sending messages to an unavailable node. The sedation concept may be applied to one or more classes of messages, messages related to one or more classes of services, or messages directed to one or more classes of service-providing nodes.

Figures 2A~C are block diagrams illustrating an exemplary system for providing a sedation service in a telecommunications network according to another embodiment of the subject matter described herein. In Figure 2A, system **200** includes a server **202**, which provides a network service to one or more clients **204**, and a sedation server **206**, whose function will be described below. In the embodiment illustrated in Figures 2A-C, clients **204** communicate with server **202** and sedation server **206** through network **208**. In one embodiment, server **202**, clients **204**, sedation server **206**, and/or network **208** may support the session initiation protocol. Alternatively, other protocols may be supported in addition to or instead of SIP. Other protocols include signaling system 7 (SS7), diameter, simple object access protocol (SOAP), remote authentication dial in user service (RADIUS), Internet protocol (IP), presence or other publication/subscription protocols, such as session initiation protocol for instant messaging and presence leveraging extensions (SIMPLE) and extensible messaging and presence protocol (XMPP), and so on.

In one embodiment, server **202** and sedation server **206** may be configured in a high-availability (HA) configuration or other configuration that provides failover such that a failure of server **202** triggers sedation server **206** to perform its sedation function. In one embodiment, each node in an HA configuration responds to both a private address that is unique to each node and a public address that is shared by all nodes. The public address, also referred to as the HA address, is an address that is associated with a service or with a node that provides that service. A client node seeking to make use of the service may send a service-related message addressed to the HA address.

10 In the embodiment illustrated in Figures 2A~C, server **202** and sedation server **206** are configured in a high-availability (HA) configuration in which messages that are addressed to a specified network address "X" will be sent to all nodes that are associated with the address X, i.e., both server **202** and sedation server **206**, but only one of the nodes will respond to the message.

15 For simplicity of description, however, messages that are sent to a HA node and that are ultimately discarded by the HA node will not be shown in Figures 2A~C. In the embodiment illustrated in Figures 2A~C, sedation server **206** may receive a periodic heartbeat message **210** from server **202**. If sedation server **206** fails to receive a next heartbeat message within a specified time limit,

20 sedation server **206** may assume that server **202** has failed and will perform a sedation function.

In one embodiment of HA, each node in the HA cluster receives a copy of these service-related messages, but only the currently active HA node responds. Since each node in the HA cluster receives a copy of the same message, the backup nodes may use the service-related messages to update subscription information, state tables, etc. In this manner, each backup node may remain wholly or partially in sync with the primary, eliminating or greatly reducing the time required for the backup node to become fully operational in response to a failover. Alternatively, server **202** may transmit synchronization data **212** to sedation server **206** in order for sedation server to be wholly or partially in sync with server **202**. For example, server **202** may provide a presence service or another service for which the current status of a subscriber is maintained. If server **202** maintains information about the status of a

subscriber, e.g., clients **204**, server **202** may transmit synchronization data **212** to sedation server **206**. In one embodiment, server **202** may update sedation server **206** whenever the status of a subscriber changes. In this way, sedation server **206** may maintain a list of subscribers and each subscriber's respective
5 status.

Anycast address routing and HA clustering are two methods of handling failover and are intended to be illustrative and not limiting. Other failure detection / failover configurations may be used to trigger the sedation operations described herein. It will be appreciated that other redundant
10 configurations are also within the scope of the subject matter described herein. In an alternative embodiment, for example, network **208** may include a router (not shown), which may implement anycast routing as described above with regard to system **100**. The operation of system **200** will now be described in detail with reference to Figures 2B and 2C.

15 In the embodiment illustrated in Figure 2B, server **202** has suffered a failure. Sedation server **206** detects the failure of server **202**, by failing to receive a heartbeat message from server **202** within the specified time limit, for example. In response to detecting the failure of server **202**, sedation server **206** will begin responding to requests sent from clients **204** that are addressed
20 to address X. For as long as server **202** remains inoperative, sedation server **206** will respond to the requests, and, in Figure 2C, sedation server **206** issues additional sedation messages as needed.

In the embodiment in Figure 2C, for example, sedation server **206** may issue SIP 5XX response messages including a retry-after parameter. In the
25 same manner described above with regard to system **100**, the retry-after parameters may be manipulated so as to temporally distribute subscriptions retry requests and thus avoid flooding server **202** with requests.

In one embodiment, sedation server **206** may continue to receive request messages, such as subscription requests, on behalf of failed server
30 **202**, and may continue to send sedation messages. In one embodiment, sedation server **206** may maintain information about the number of subscription attempts made by subscription clients **204**. For example, sedation server **206** may increase the retry-after or wait time in response to every resubscription

attempt that fails, or it may allow only a certain number of attempts before sending a message to the subscription client instructing it to halt attempts at resubscription, or to halt until further notice.

In one embodiment, once server **202** recovers, sedation server **206** may
5 detect the recovery of server **202**, e.g., by resumed heartbeat messages from server **202** to sedation server **206**. In response to the recovery of server **202**, sedation server **206** may cease receiving or responding to subscription requests and cease generation of sedation messages.

Systems **100** and **200** are two embodiments for providing sedation
10 service in a telecommunications network, illustrating differences in how the sedation function is triggered, as well as differences in how the failure is detected and by which node. For example, in system **100**, the node that generates the sedation messages (SIP sedation server **106**) is different from the node (router **108**) that detects the failure of the service providing node (SIP
15 proxy **102**). In system **200**, on the other hand, the same node (sedation server **206**) both detects the failure of the service providing node (server **202**) and generates the sedation messages. In system **100**, sedation server **106** is triggered by receipt of query messages from router **108**. In contrast, in system
20 **200**, sedation server **206** is triggered by a failure to receive a heartbeat message. Other implementations are considered within the scope of the subject matter described herein.

Furthermore, a sedation node can provide a variety of sedation services. For example, a sedation server may perform the functions of SIP sedation server **106**, the functions of sedation server **206**, other sedation functions, or
25 some combination. In one embodiment, the sedation service may be performed in response to transient events in the telecommunication network, such as temporary outages or failures of nodes, datalinks or other communications paths, network services, network functions, etc.

Figure 3 is a flow chart illustrating an exemplary process providing
30 sedation service in a telecommunications network according to an embodiment of the subject matter described herein. Referring to Figure 3, at block **300**, a SIP sedation node receives a first message sent from a SIP user agent and intended for a SIP server. At block **302**, it is determined whether the SIP server

is unavailable. For example, router **106** in Figure 1B may detect the failure of SIP proxy **102**; sedation server **206** in Figure 2A may detect the failure of server **202**. At block **304**, responsive to a determination that the SIP server is unavailable to respond to the first message, a SIP sedation message for
5 reducing the number or frequency of messages sent by the SIP user agent to the SIP server is sent to the user agent. For example, SIP sedation server **106** may send SIP 5XX RETRY messages to clients **104** in response to indirect detection of the failure of SIP proxy **102**, i.e., by starting to receive messages addressed to anycast address X, which router **108** formerly routed to SIP proxy
10 **102** but now is routing to SIP sedation server **106**.

It will be understood that various details of the subject matter described herein may be changed without departing from the scope of the subject matter described herein. Furthermore, the foregoing description is for the purpose of illustration only, and not for the purpose of limitation.

CLAIMS

What is claimed is:

1. A method for providing sedation service in a telecommunications network, the method comprising:
5 at a session initiation protocol (SIP) sedation node:
receiving a first message sent from a SIP user agent and intended for a SIP server;
determining whether the SIP server is unavailable;
responsive to a determination that the SIP server is unavailable
10 to respond to the first message, sending, to the SIP user agent, a SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.
2. The method of claim 1 wherein the SIP sedation node comprises a SIP sedation server.
- 15 3. The method of claim 1 wherein the SIP sedation node provides at least one sedation service in the telecommunications network for at least one group of nodes within the telecommunications network.
4. The method of claim 1 wherein the telecommunications network supports at least one of an Internet protocol, SIP, a diameter protocol, a
20 simple object access protocol (SOAP), a remote authentication dial in user service (RADIUS) protocol, a presence protocol, and a system signaling 7 (SS7) protocol.
5. The method of claim 1 wherein the first message comprises one of an Internet protocol (IP) message, a session initiation protocol (SIP)
25 message, and a system signaling 7 (SS7) message.
6. The method of claim 1 wherein the first message comprises one of a registration request, a subscribe request, and an invite request.
7. The method of claim 1 wherein the SIP user agent comprises a SIP user agent client.

8. The method of claim 1 wherein the SIP server comprises at least one of a SIP application server, a SIP proxy server, a SIP user agent server, a SIP registrar, a presence server, and an Internet protocol multimedia subsystem (IMS) call session control function (CSCF).
- 5 9. The method of claim 1 wherein the SIP server and the sedation node are configured to share an anycast IP address and wherein the SIP sedation node determines that the SIP server node is unavailable to respond to the first message when the SIP sedation node receives the first message.
- 10 10. The method of claim 1 wherein the first message sent from the user agent and intended for the SIP server is received by a routing node, which sends the message to the sedation node upon a determination that the SIP server is unavailable and which sends the message to the SIP server upon a determination that the SIP server is available.
- 15 11. The method of claim 10 wherein the routing node is an IP anycast address routing node.
12. The method of claim 1 wherein the SIP server and the sedation node are configured to share a high-availability (HA) address and wherein the sedation node determines that the SIP server is unavailable to respond to the first message when the sedation node receives the first message.
- 20 13. The method of claim 1 wherein the message sent from the user agent and intended for the SIP server is received by a routing node, which sends the message to both the SIP server and the sedation node.
14. The method of claim 1 wherein the SIP server and the sedation node are configured in a high-availability configuration.
- 25 15. The method of claim 1 wherein a heartbeat message or the absence thereof is used to detect the failure of the SIP server node.

16. The method of claim 1 wherein the SIP server and the sedation node are configured to share a common network address.
17. The method of claim 16 wherein the common network address comprises at least one of an Anycast Internet protocol (IP) address and a high-availability address.
18. The method of claim 1 wherein the sedation message indicates an amount of time that the user agent should wait before sending a message to the SIP server or instructs the user agent not to send messages to the SIP server.
19. The method of claim 18 wherein the sedation message specifies the amount of time and wherein the amount of time comprises at least one of:
- a value that is the same for all nodes;
 - a value that is unique to each node;
 - a value that is based on a class of the (client) node;
 - a constant value;
 - a value that is programmatically determined; and
 - a value that is randomly determined.
20. A method for providing sedation service in a telecommunications network, the method comprising:
- at a session initiation protocol (SIP) sedation node:
 - in response to a SIP server becoming unavailable, receiving a first message sent from a SIP user agent that is intended for the SIP server; and
 - in response to receiving the first message, sending, to the user agent, a SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.
21. A system for providing sedation service in a telecommunications network, the system comprising:

a session initiation protocol (SIP) sedation node that is configured for:

receiving a first message sent from a SIP user agent and intended for a SIP server;

5 determining whether the SIP server is unavailable;

responsive to a determination that the SIP server is unavailable to respond to the first message, sending, to the SIP user agent, a SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.

10 22. The system of claim 21 wherein the sedation message comprises a session initiation protocol (SIP) message.

23. The system of claim 20 wherein the sedation message indicates an amount of time that the user agent should wait before sending a message to the SIP server or instructs the user agent not to send
15 messages to the SIP server.

24. The system of claim 23 wherein the sedation message indicates an amount of time and wherein the amount of time comprises at least one of:

20 a value that is the same for all nodes;
a value that is unique to each node;
a value that is based on a class of the (client) node;
a constant value;
a value that is programmatically determined; and
a value that is randomly determined.

25 25. The system of claim 21 wherein the SIP server comprises at least one of a SIP proxy server, a SIP registrar, a SIP user agent server, an Internet protocol multimedia subsystem (IMS) call session control function (CSCF), and a presence server.

26. The system of claim 21 wherein the sedation message is sent to the
30 (client) node in response to receiving, at the sedation node, a first

message that was sent from the user agent and intended for the SIP server.

27. The system of claim 26 wherein the first message comprises a SIP message.
- 5 28. The system of claim 27 wherein the first message comprises one of a registration request, a subscribe request, and an invite request.
29. The system of claim 21 wherein the SIP user agent comprises a SIP user agent client.
- 10 30. The system of claim 21 wherein the message sent from the user agent and intended for the SIP server is received by a routing node, which sends the message to the sedation node upon a determination that the SIP server is unavailable and which sends the message to the SIP server upon a determination that the SIP server is available.
- 15 31. The system of claim 30 wherein the routing node is an IP anycast address routing node.
32. The system of claim 21 wherein the message sent from the user agent and intended for the SIP server is received by a routing node, which sends the message to both the SIP server and the routing node.
- 20 33. The system of claim 21 wherein the SIP server and the sedation node are configured in a high-availability configuration.
34. The system of claim 21 wherein a heartbeat message or the absence thereof is used to detect the unavailability of the SIP server.
35. The system of claim 21 wherein the SIP server and the sedation node are configured to share a common network address.
- 25 36. The system of claim 35 wherein the common network address comprises an IP anycast address.

37. A system for providing sedation service in a telecommunications network, the method comprising:
a session initiation protocol (SIP) sedation node configured for:
in response to a SIP server becoming unavailable, receiving a
5 first message sent from a SIP user agent that is intended for the SIP server; and
in response to receiving the first message, sending, to the user agent, SIP sedation message for reducing the number or frequency of messages sent by the SIP user agent to the SIP server.
- 10 38. A computer readable medium having stored thereon computer-executable instructions that when executed by the processor of a computer control the computer to perform steps comprising:
at a session initiation protocol (SIP) sedation node:
receiving a first message sent from a SIP user agent and
15 intended for a SIP server;
determining whether the SIP server is unavailable;
responsive to a determination that the SIP server is unavailable to respond to the first message, sending, to the SIP user agent, a SIP sedation message for reducing the number or frequency of messages
20 sent by the SIP user agent to the SIP server.
39. A computer readable medium having stored thereon computer-executable instructions that when executed by the processor of a computer control the computer to perform steps comprising:
at a session initiation protocol (SIP) sedation node:
25 in response to a SIP server becoming unavailable, receiving a first message sent from a SIP user agent that is intended for the SIP server; and
in response to receiving the first message, sending, to the user agent, a SIP sedation message for reducing the number or frequency of
30 messages sent by the SIP user agent to the SIP server.

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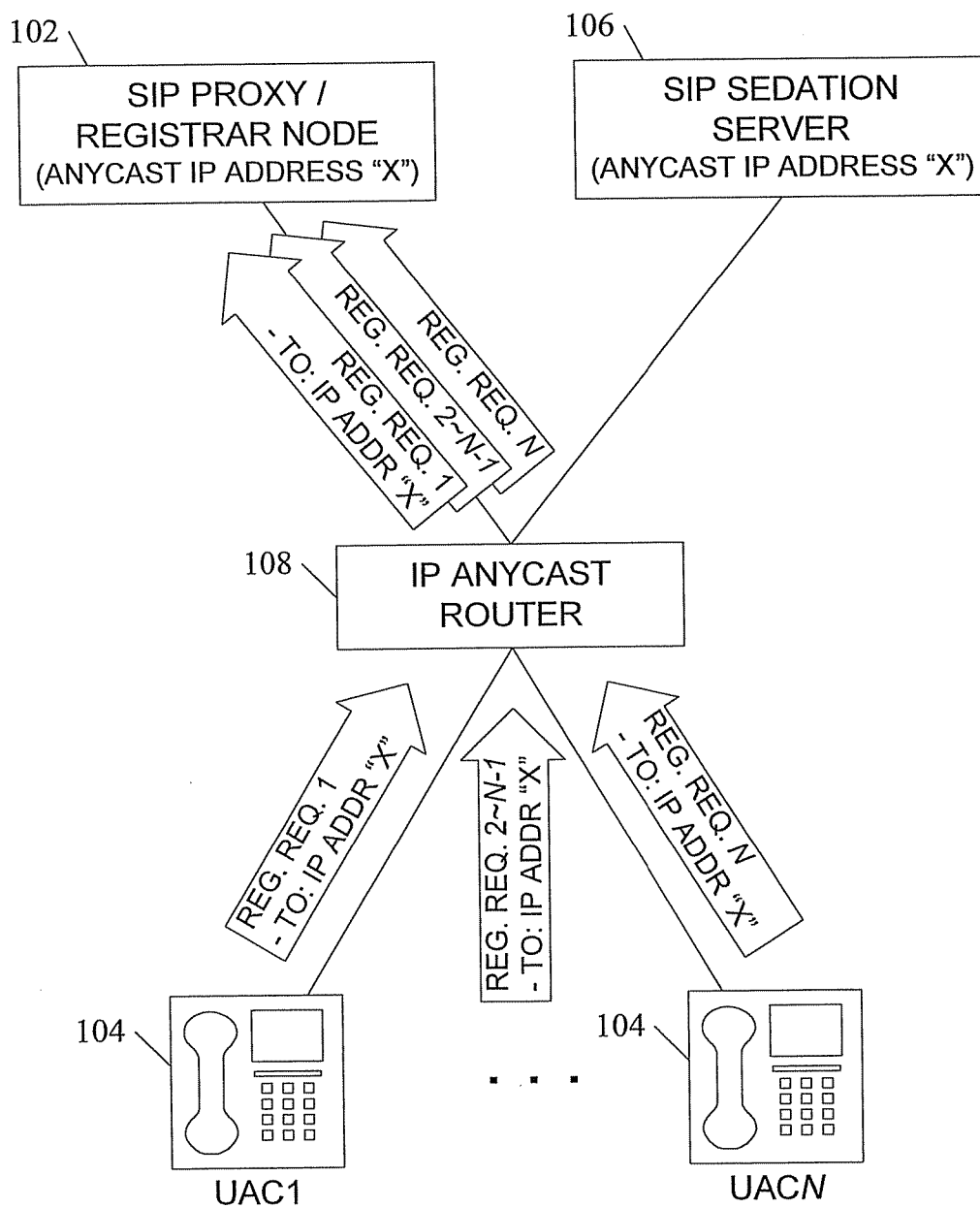
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FIG. 1A

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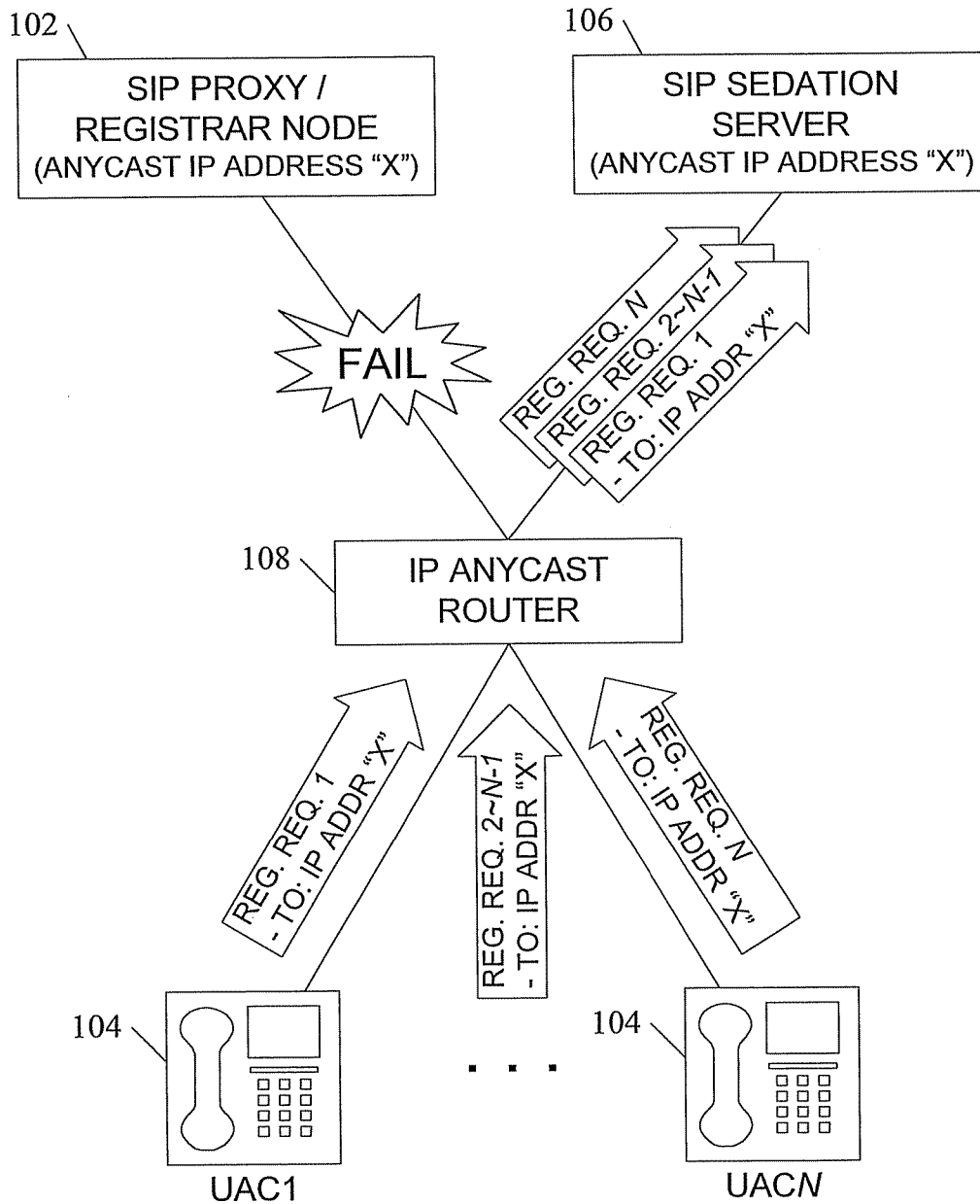
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FIG. 1B

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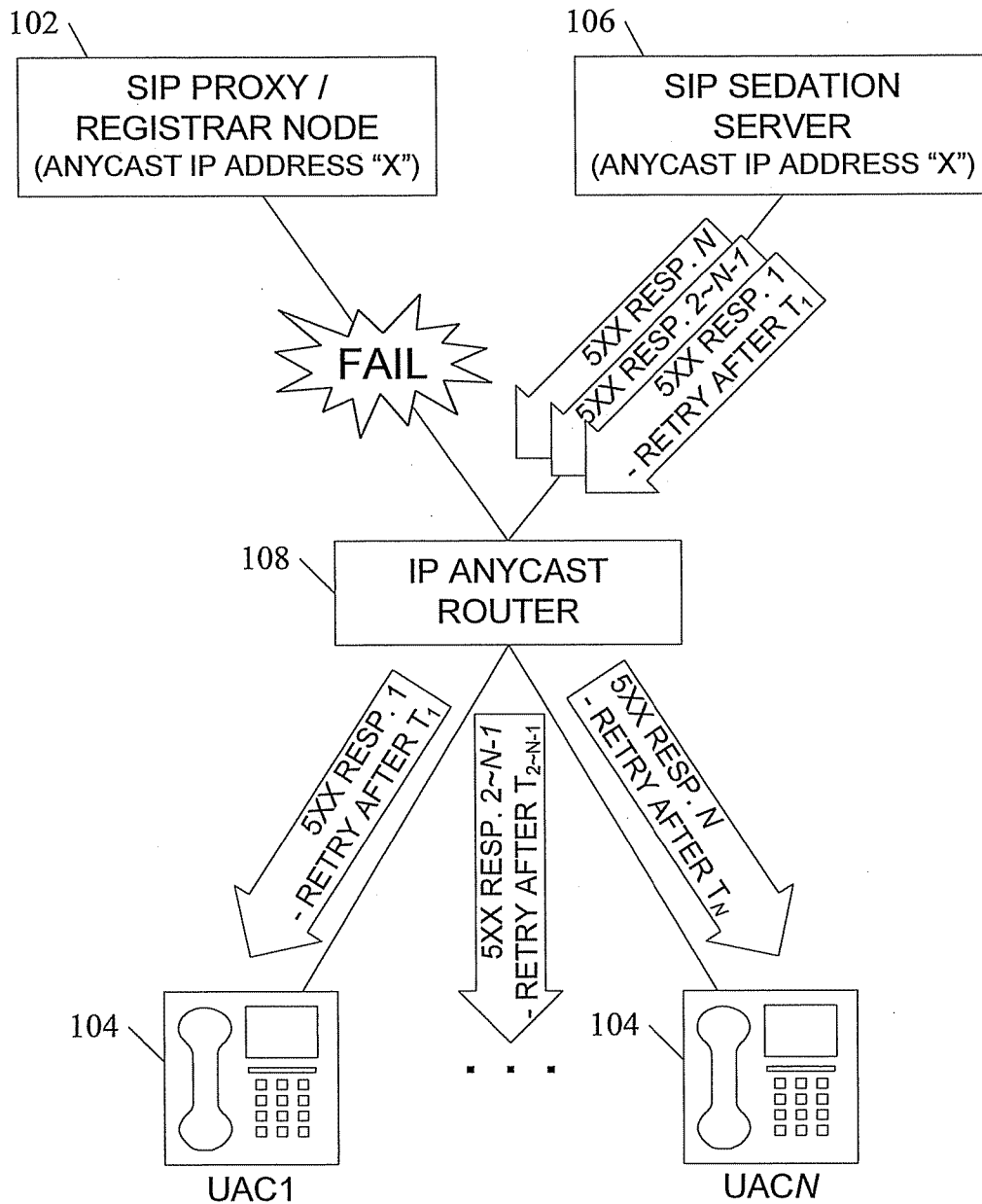
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FIG. 1C

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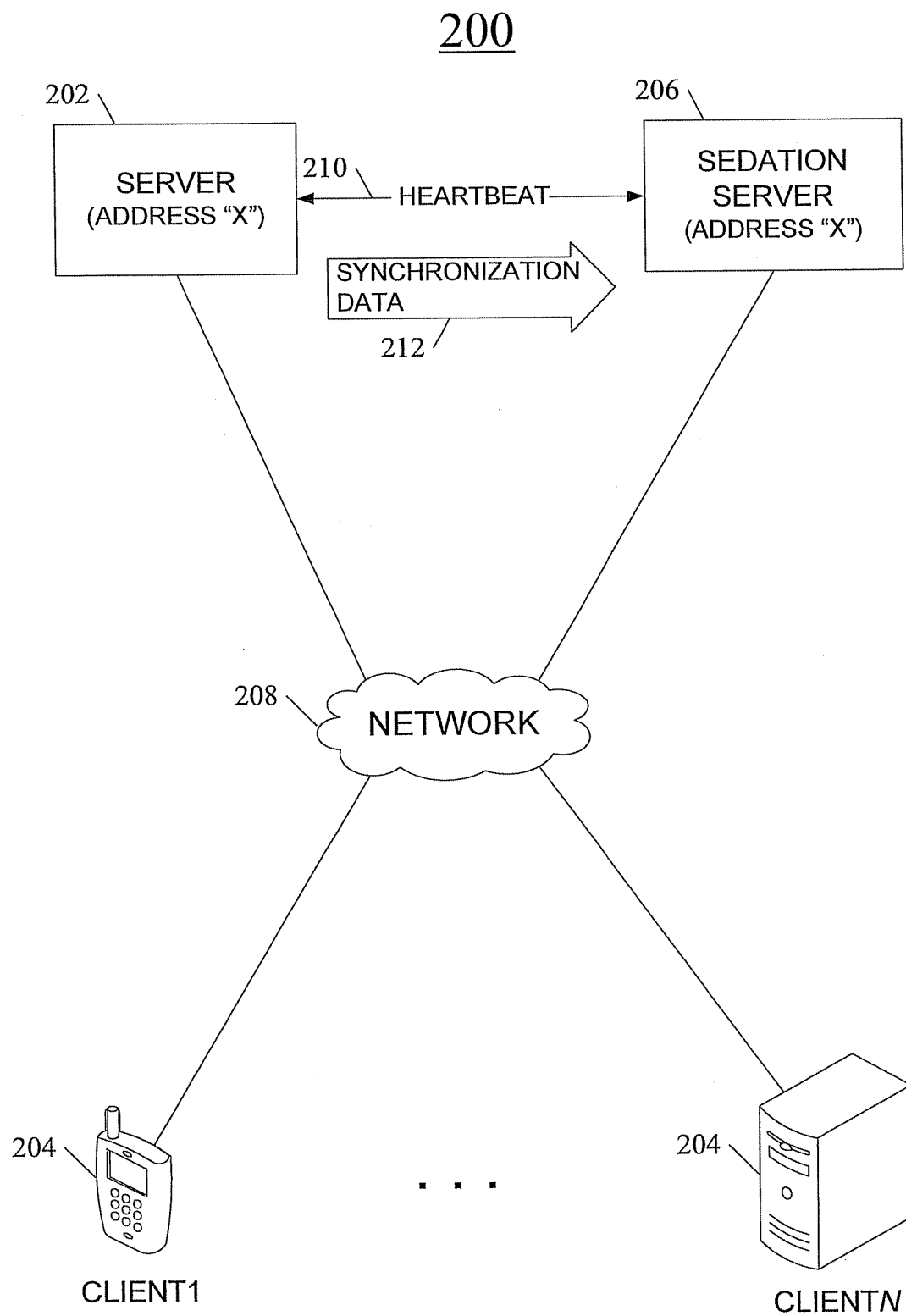


FIG. 2A

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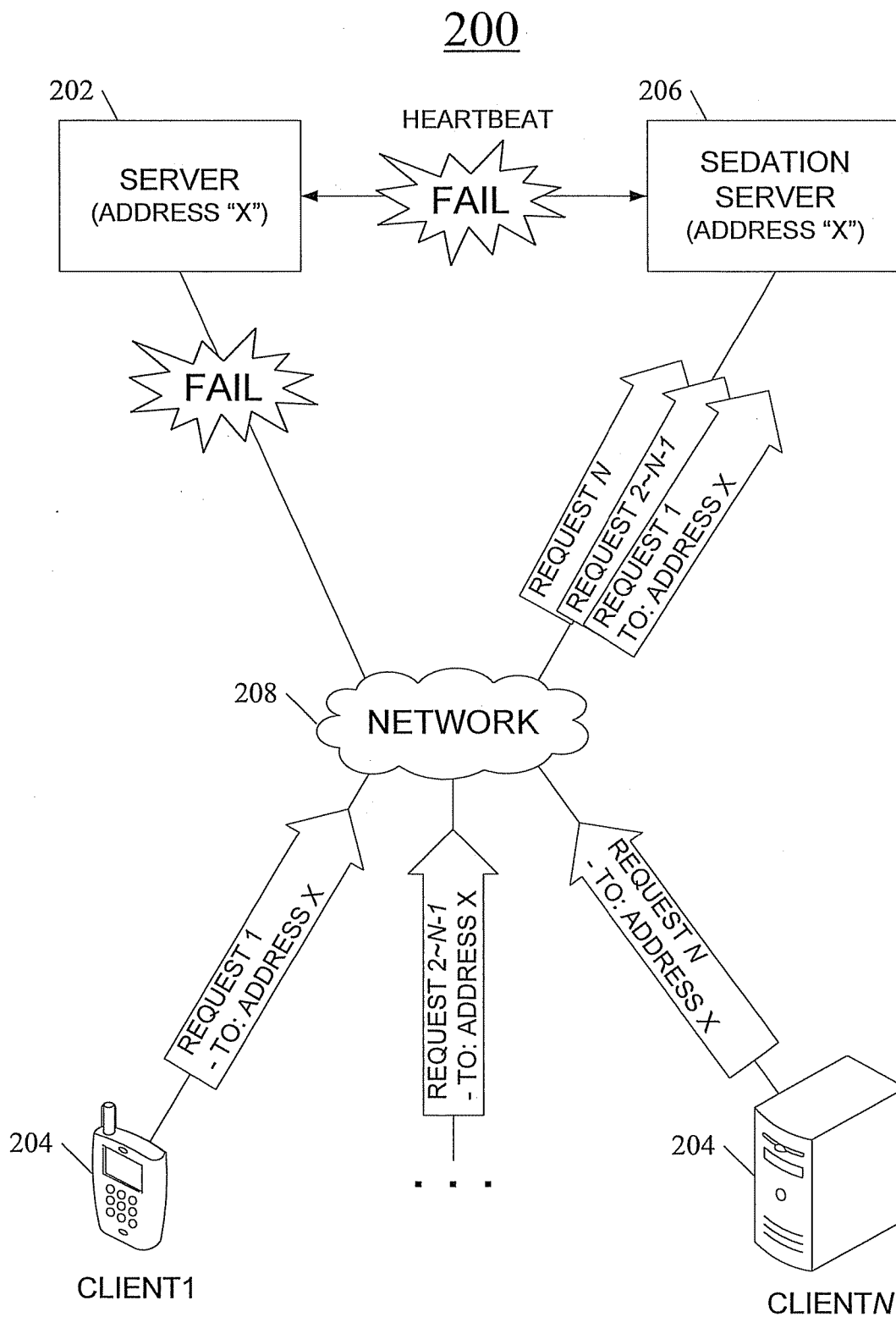


FIG. 2B

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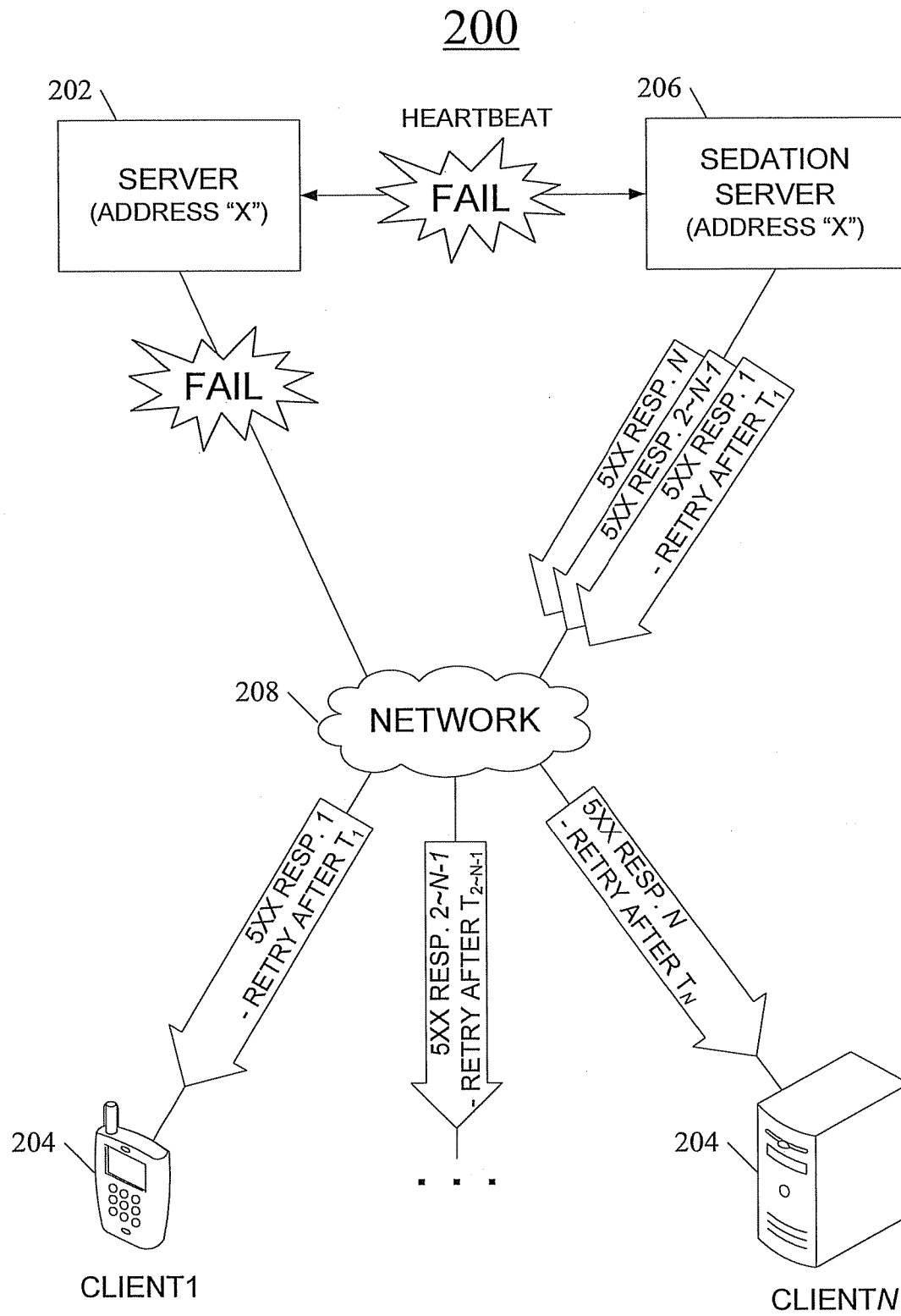


FIG. 2C

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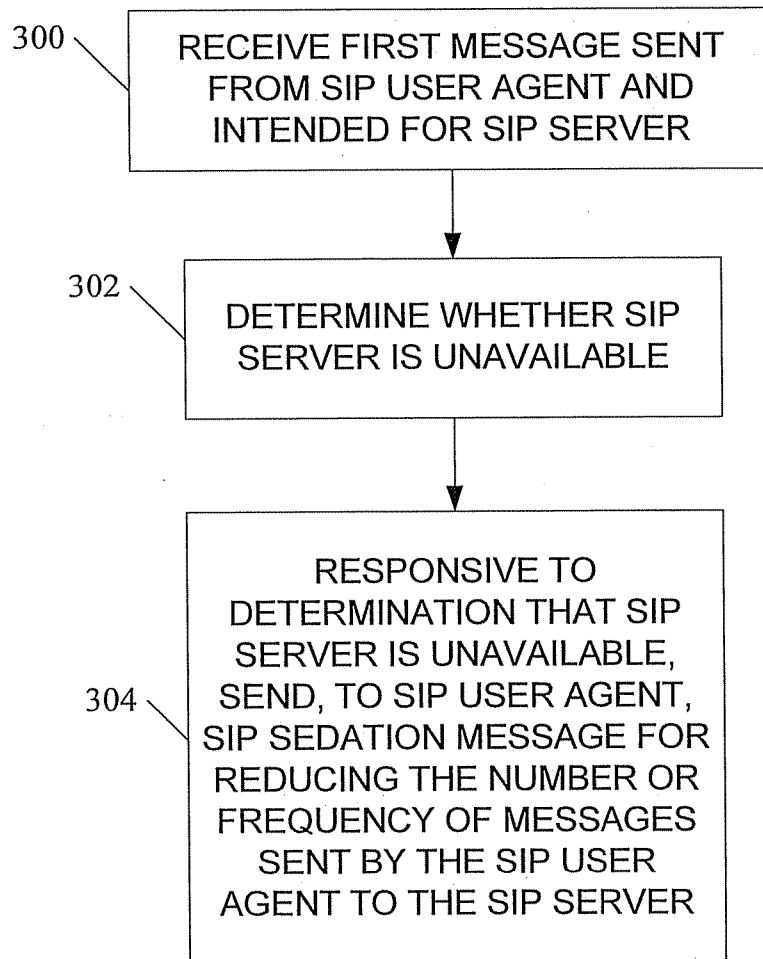


FIG. 3