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(54) **SYSTEM TO RECORD AND ANALYZE VOICE MESSAGE USAGE INFORMATION**

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(58) **Field of Classification Search** 379/88.23–88.25, 379/88.18

See application file for complete search history.

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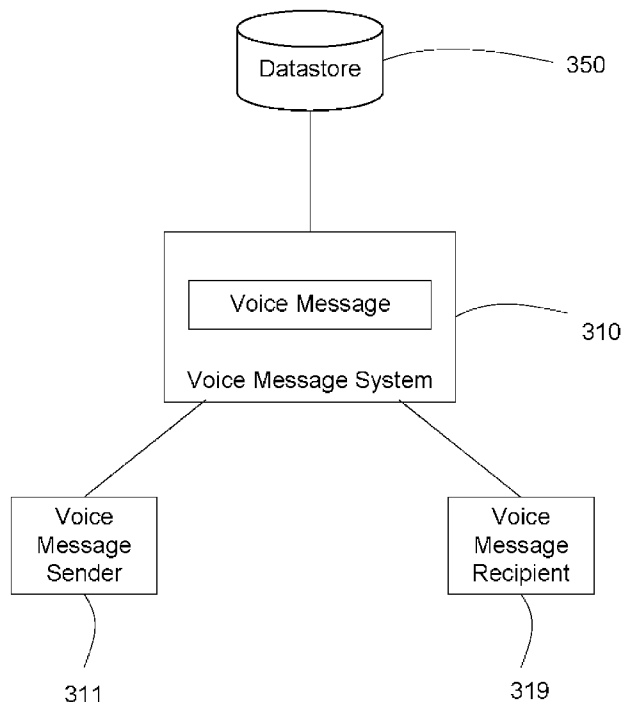
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(57) **ABSTRACT**

A voice message system records voice message usage information by creating voice message records when a voice message is sent and when it is received. The voice message record includes: the voice message, a voice message sender identity, a voice message recipient identity, and voice message action records. A voice message action records includes a voice message action that specifies an action on the voice message, and a voice message action time that includes the time at which the action occurs. Voice message actions include sent, received, and listened. The system further includes a voice message analyzer for analyzing voice message records, and a voice message reporter for generating reports from an analysis by the analyzer. The voice message system provides traceable information for voice messages, allowing companies to enforce a voice message usage policy.

29 Claims, 8 Drawing Sheets



Voice Message System

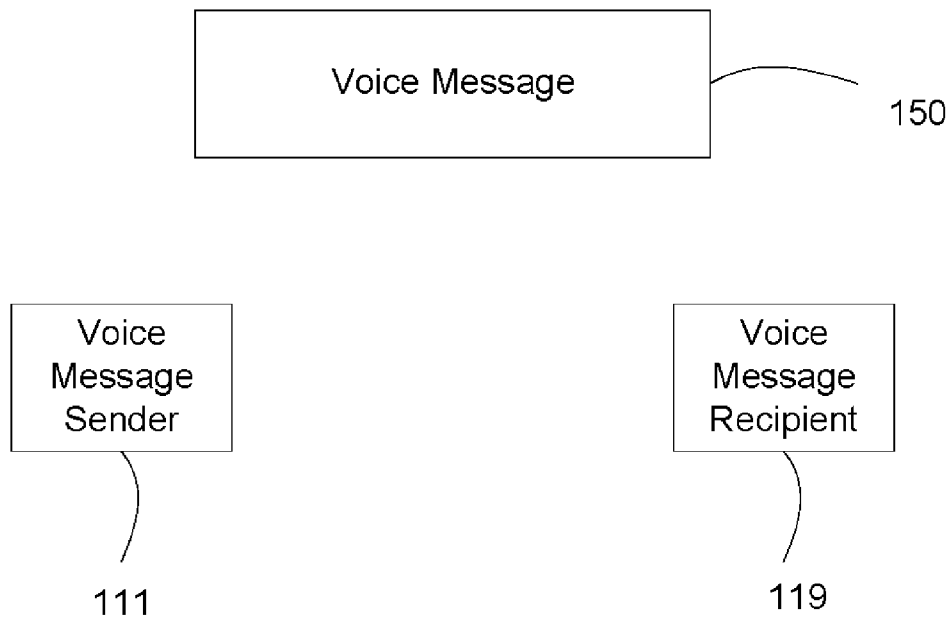


Figure 1. Voice Message, Voice Message Sender and Voice Message Recipient

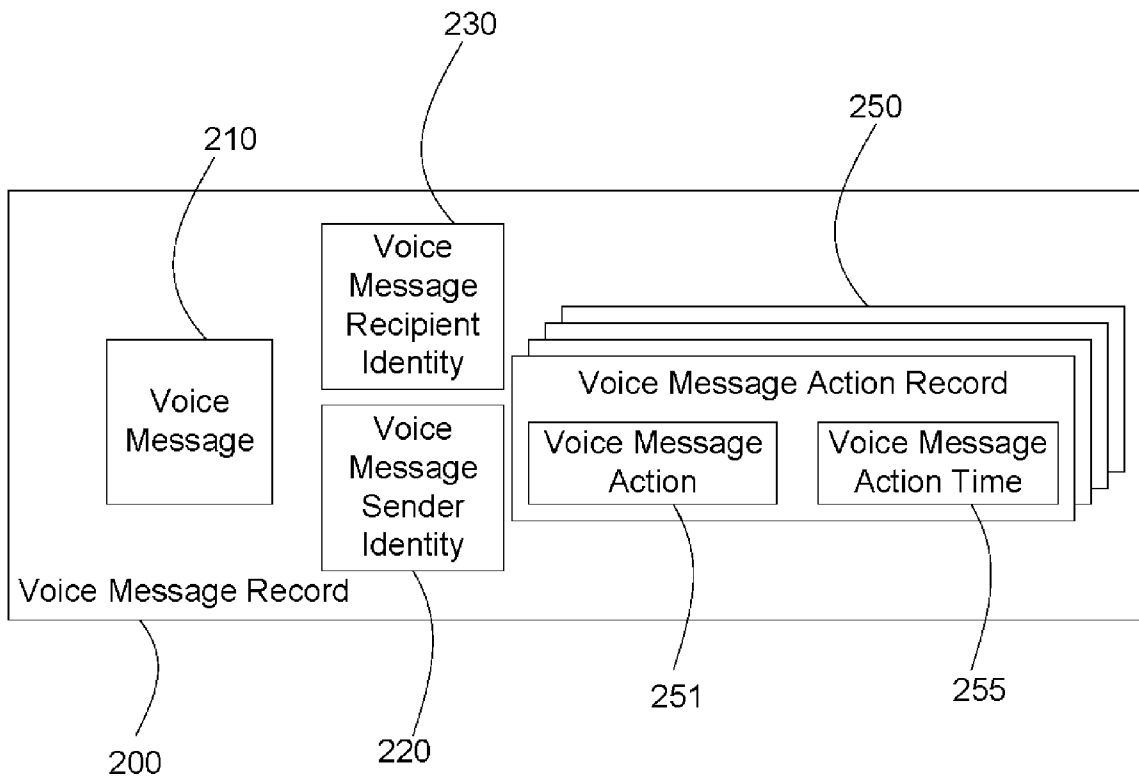


Figure 2. Voice Message Record

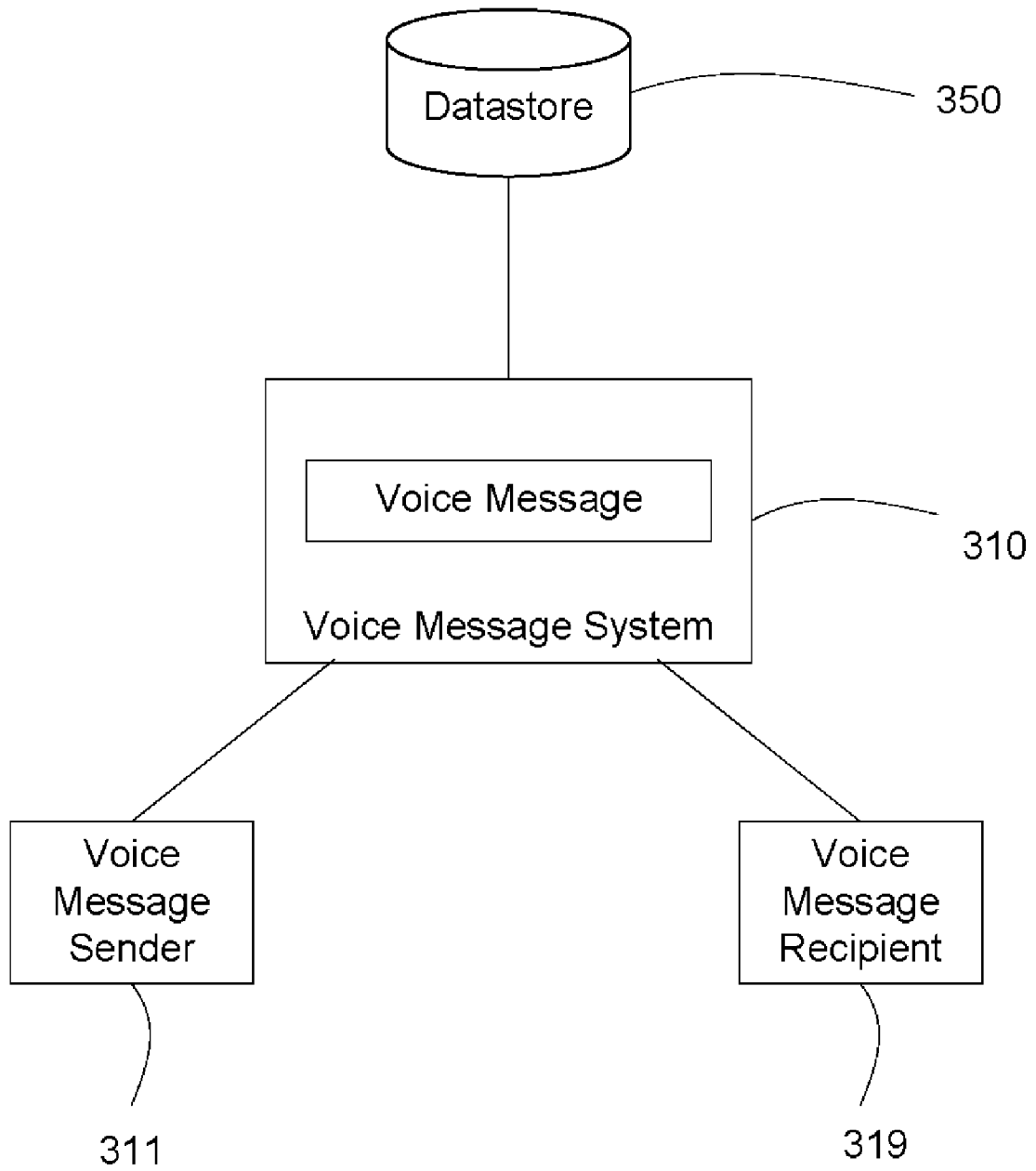


Figure 3. Voice Message System

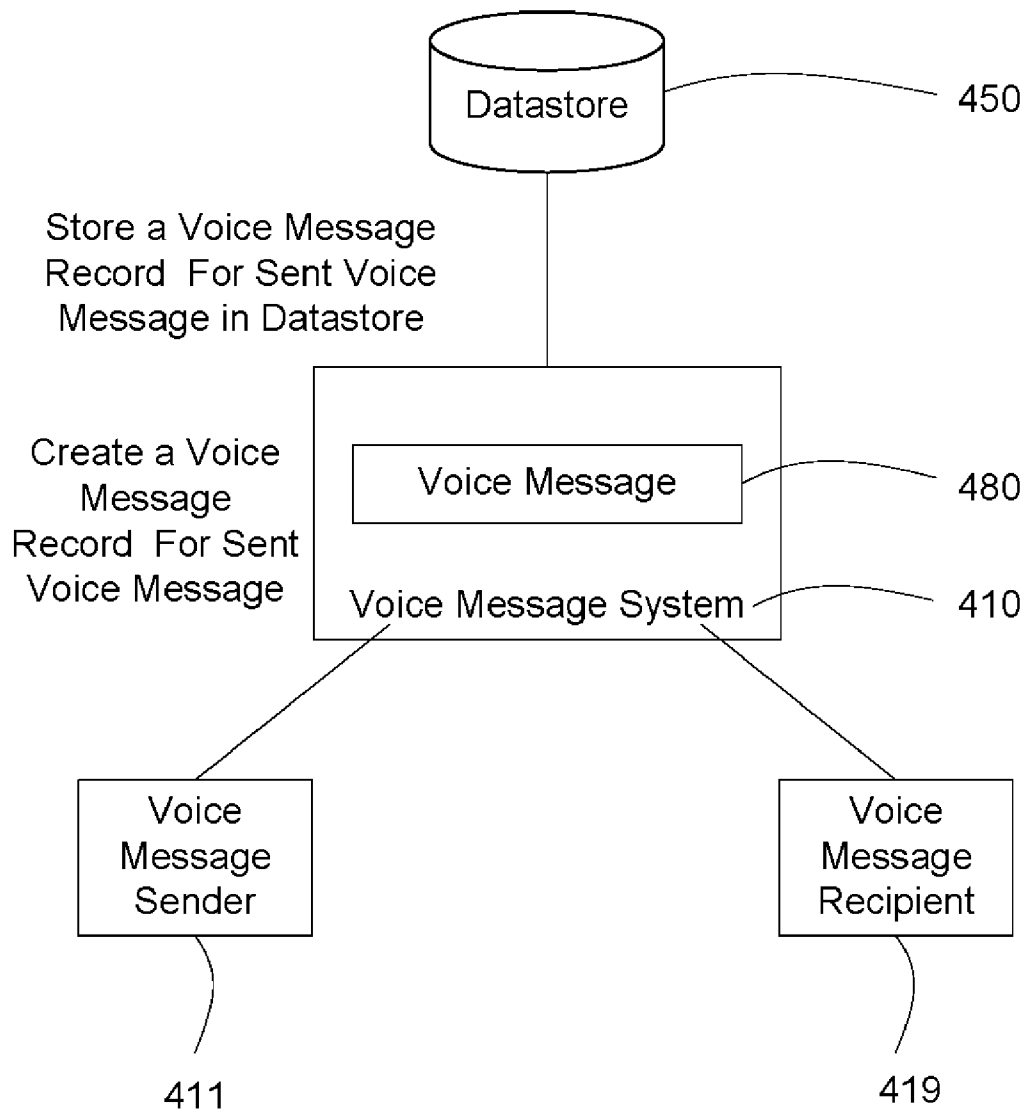


Figure 4. A Process to record sending information about a Voice Message

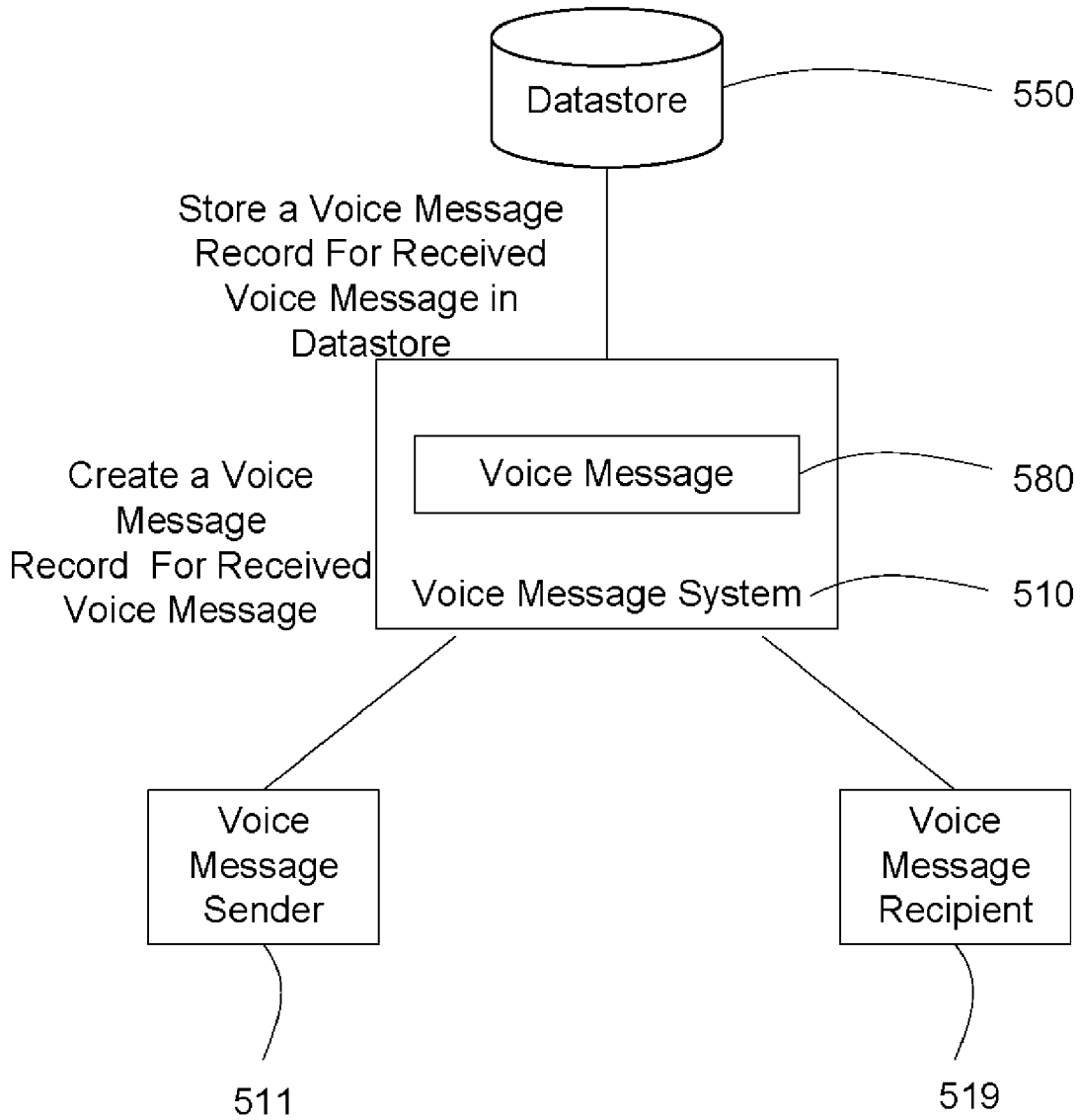


Figure 5. A Process to record receiving information about a Voice Message

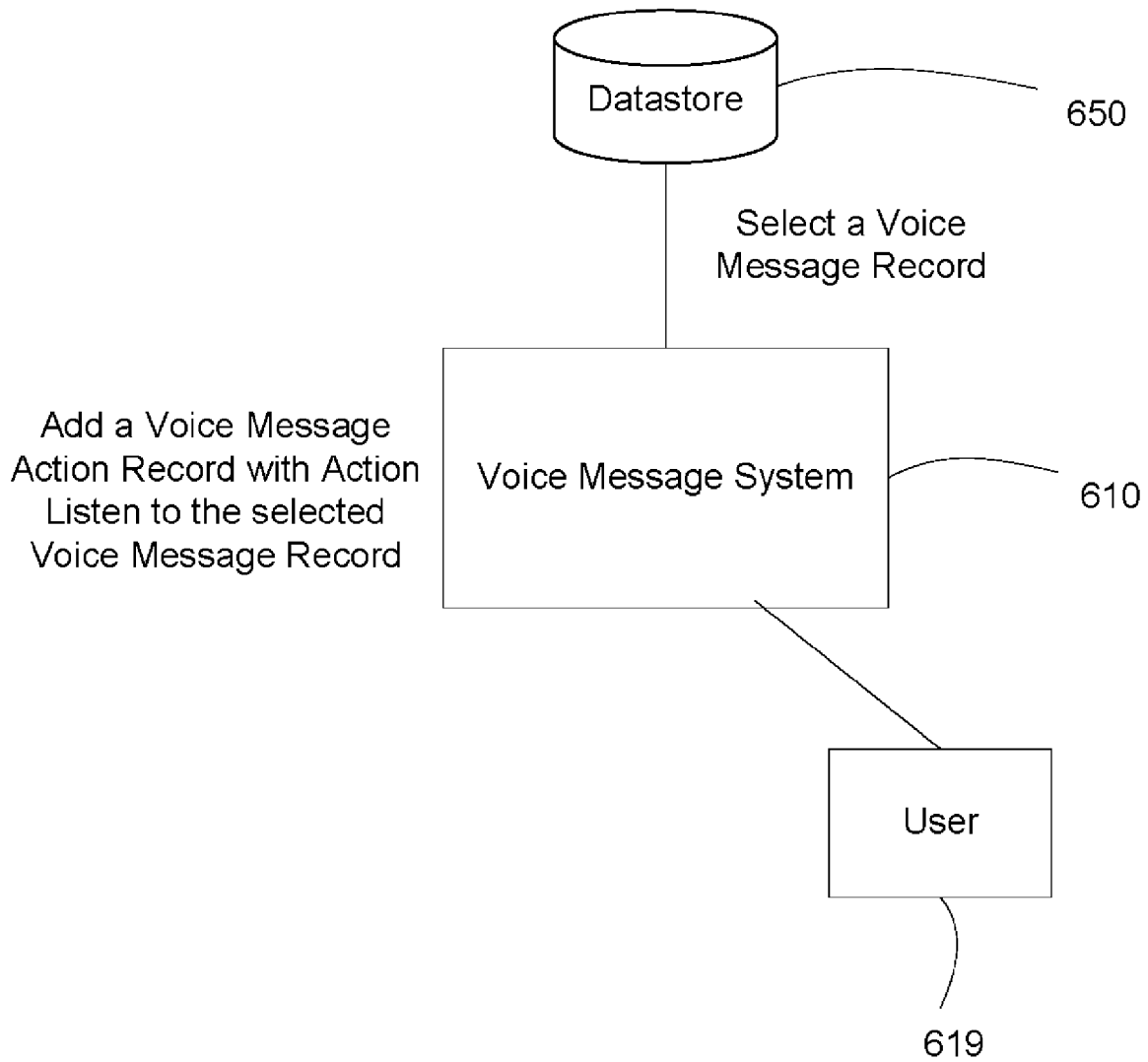


Figure 6. A Process to record listening information about to a Voice Message

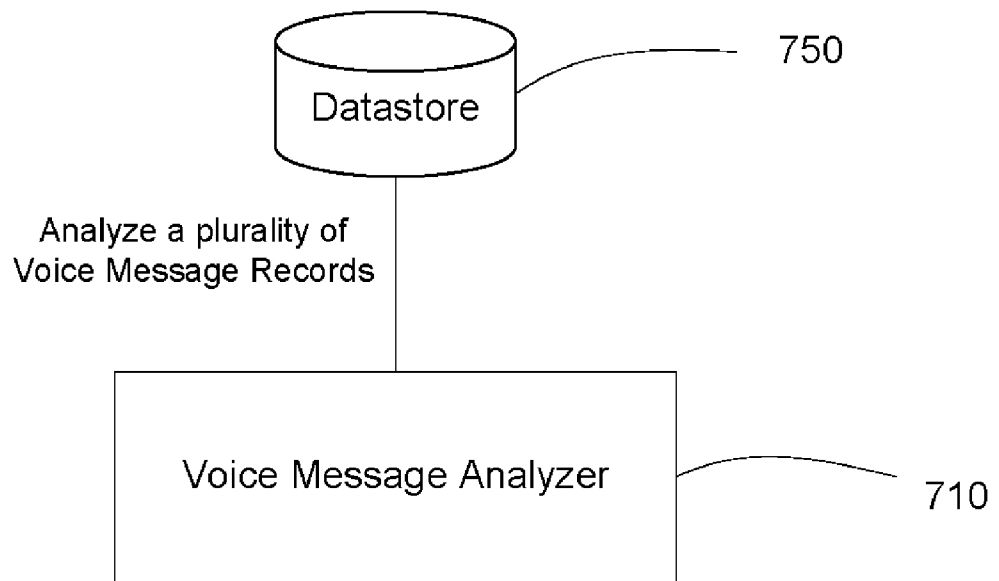


Figure 7. A Process of analyzing a plurality of Voice Messages

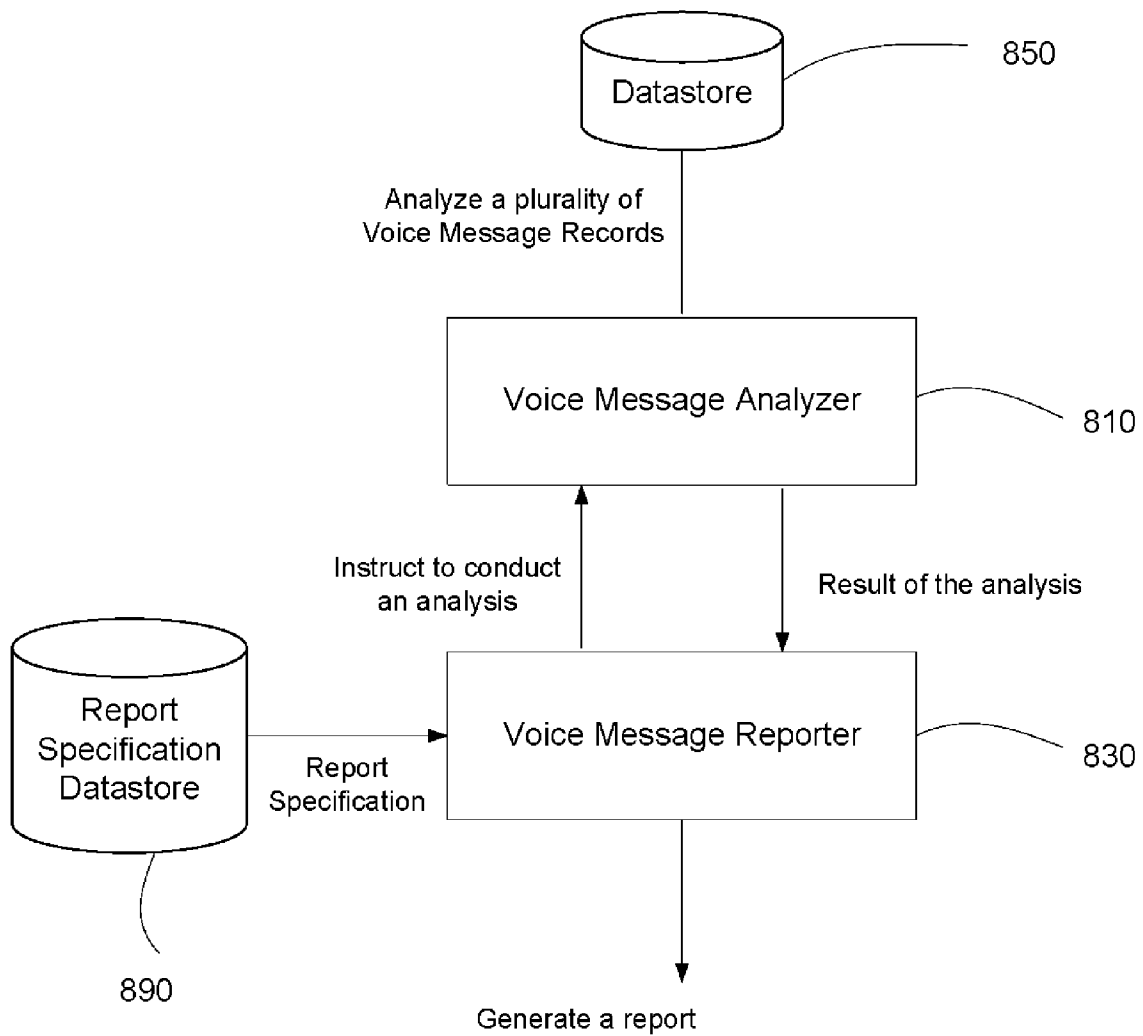


Figure 8. A Process of reporting on a plurality of Voice Messages

1

SYSTEM TO RECORD AND ANALYZE VOICE MESSAGE USAGE INFORMATION

BACKGROUND

1. Field

This invention relates generally to telecommunications, and more specifically, to a system to record and analyze voice message usage information.

2. Related Art

Voice mail systems, also known as voice message systems, gained popularity in the corporate world since its introduction in late 1970s. A user can leave a voice message at a voice mail system for another user without the assistance of an attendant or a secretary. Likewise, a user can listen to his or her voice messages from a voice mail system without the assistance of an attendant or a secretary.

Voice mail systems have since become an essential communications tool for businesses, government agencies, education institutions and communities. While providing convenience for the users to conduct business and for personal use, the usage of voice messages for communications creates a set of privacy problems.

In one example, John works for Central Realtors as a real estate broker. John uses the company's voice message system for both business and personal purposes. The company publishes a voice message usage policy, which respects the privacy of its employees. However, there is no tractable information to allow the company to distinguish between a business voice message and a personal voice message in order to apply usage measures as stated.

In another example, the management of Corner Technologies suspects that an employee has been leaking proprietary information to a competitor, and would like to collect evidence, including the employee's voice messages between Aug. 10 and Aug. 22, 2003. However, the employee has already deleted these voice messages, and there is no consistent backup procedure to ensure the availability of deleted voice messages.

Accordingly, there exists a need for a method and system for recording and analyzing voice message usage information. The present invention addresses such a need.

SUMMARY

A voice message system records voice message usage information by creating voice message records when a voice message is sent and when it is received. The voice message record includes: the voice message, a voice message sender identity, a voice message recipient identity, and voice message action records. A voice message action records includes a voice message action that specifies an action on the voice message, and a voice message action time that includes the time at which the action occurs. Voice message actions include sent, received, and listened. The system further includes a voice message analyzer for analyzing voice message records, and a voice message reporter for generating reports from an analysis by the analyzer. The voice message system provides tractable information for voice messages, allowing companies to enforce a voice message usage policy.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 illustrates a Voice Message, a Voice Message Sender, and a Voice Message Recipient.

FIG. 2 illustrates a Voice Message Record.

FIG. 3 illustrates a Voice Message System.

2

FIG. 4 illustrates a process to record sending information about a Voice Message.

FIG. 5 illustrates a process to record receiving information about a Voice Message.

5 FIG. 6 illustrates a process to record listening information about Voice Message.

FIG. 7 illustrates a process of analyzing a plurality of Voice Message Records.

10 FIG. 8 illustrates a process of reporting on a plurality of Voice Message Records.

DETAILED DESCRIPTION

FIG. 1 illustrates a Voice Message **150**, a Voice Message Sender **111** and a Voice Message Recipient **119**. Voice Message **150** includes a recorded spoken message from Voice Message Sender **111** to Voice Message Recipient **119**.

FIG. 2 illustrates a Voice Message Record. A Voice Message Record includes usage information about a Voice Message.

A Voice Message Record **200** includes a Voice Message **210**, a Voice Message Sender Identity **220**, a Voice Message Recipient Identity **230**, and a plurality of Voice Message Action Records **250**.

Voice Message Sender Identity **220** identifies the Voice Message Sender **111** who sends a Voice Message **210**. Voice Message Recipient Identity **230** identifies the Voice Message Recipient **119** who receives the Voice Message **210**.

A Voice Message Action Record **250** records one or more actions on Voice Message **210**.

A Voice Message Action Record **250** includes a Voice Message Action **251** that specifies the action, and a Voice Message Action Time **255** that includes the time at which the action indicated in Voice Message Action **251** occurs. In one embodiment, Voice Message Action Time **255** includes the time of day at which the action occurs. In another embodiment, Voice Message Action Time **255** includes the time period during which the action occurs.

FIG. 3 illustrates a Voice Message System.

Voice Message System **310** connects to a Datastore **350**. Datastore **350** stores a plurality of Voice Message Records. A Voice Message Sender **311** connects to Voice Message System **310** to send a Voice Message. A Voice Message Recipient **319** connects to a Voice Message System **310** to listen to a Voice Message.

Voice Message System **310** includes a plurality of processes. One embodiment includes processes to record sending information, receiving information, or listening information about a Voice Message. One embodiment includes processes of analyzing or reporting on the plurality of Voice Message Records. The processes are discussed in subsequent illustrations.

FIG. 4 illustrates a process to record sending information about a Voice Message.

A Voice Message Sender **411** connects to a Voice Message System **410** and sends a Voice Message **480**. The recipient of Voice Message **480** is Voice Message Recipient **419**. Voice Message System **410** receives Voice Message **480**. Voice Message System **410** creates a Voice Message Record.

Voice Message System **410** includes Voice Message **480** in the Voice Message Record for the sent Voice Message.

Voice Message System **410** includes a Voice Message Sender Identity of Voice Message Sender **411** in the Voice Message Record.

65 In one embodiment, Voice Message Sender **411** connects to Voice Message System **410** in a telephone call via a telephone system. In one embodiment, the telephone system provides to

Voice Message System 410 a telephone extension number of the telephone used in the connection. Voice Message System 410 includes the telephone extension number in the Voice Message Sender Identity. In one embodiment, Voice Message System 410 obtains a user name based on the telephone extension number. Voice Message System 410 includes the user name in the Voice Message Sender Identity. In another embodiment, the telephone system provides Voice Message System 410 the calling party telephone number of the telephone call. Voice Message System 410 includes the calling party telephone number in the Voice Message Sender Identity. In one embodiment, the telephone system provides Voice Message System 410 the caller identity of the telephone call. Voice Message System 410 includes the caller identity in the Voice Message Sender Identity. In one other embodiment, Voice Message System 410 prompts Voice Message Sender 411 for information about Voice Message Sender 411. Voice Message Sender 411 provides Voice Message System 410 the information. Voice Message System 410 includes the information in the Voice Message Sender Identity. In one embodiment, the information includes a user identity for the Voice Message Sender 411.

In another embodiment, Voice Message Sender 411 connects to Voice Message System 410 via an electronic message system. Voice Message Sender 411 sends Voice Message 480 in an electronic message. In one embodiment, the electronic message system provides Voice Message System 410 a sender identity of the electronic message.

Voice Message System 410 includes the sender identity in the Voice Message Sender Identity.

Voice Message System 410 includes a Voice Message Recipient Identity of Voice Message Recipient 419 in the Voice Message Record.

In one embodiment, Voice Message Sender 411 connects to Voice Message System 410 in a telephone call via a telephone system. In one embodiment, the telephone system provides Voice Message System 410 the digits Voice Message Sender 411 dials when setting up the telephone call. Voice Message System 410 includes the dialed digits in the Voice Message Recipient Identity. In another embodiment, Voice Message System 410 prompts Voice Message Sender 411 for information about Voice Message Recipient 419. Voice Message Sender 411 provides Voice Message System 410 the information. Voice Message System 410 includes the information in the Voice Message Recipient Identity. In one embodiment, the information includes a user identity for the Voice Message Recipient 419.

In another embodiment, Voice Message Sender 411 connects to Voice Message System 410 via an electronic message system. Voice Message Sender 411 sends Voice Message 480 in an electronic message. In one embodiment, the electronic message system provides Voice Message System 410 a recipient identity of the electronic message.

Voice Message System 410 includes the recipient identity in the Voice Message Recipient Identity.

Voice Message System 410 further includes in the Voice Message Record a Voice Message Action Record with Voice Message Action set to Action Send. In one embodiment, Voice Message System 410 includes the current time of day in the Voice Message Action Time of the Voice Message Action Record. In another embodiment, the electronic message system provides Voice Message System 410 a sending time. The sending time is the time of day when Voice Message Sender 411 sends the electronic message that includes Voice Message 480. Voice Message System 410 includes the sending time in the Voice Message Action Time of the Voice Message Action Record.

In one embodiment, the Voice Message Sender Identity in a Voice Message Record indicates the location of the Voice Message Sender 411 identified by the Voice Message Sender Identity at the time when the Voice Message Sender 411 sends the Voice Message 480 that is included in the Voice Message Record. In one embodiment, the Voice Message Sender Identity includes a telephone extension number. In one embodiment, the telephone extension number indicates the location based on a telephone wiring plan of a Private Branch Exchange (PBX) that connects to the telephone extension. In one embodiment, the location is a cubicle. In another embodiment, the location is a conference room. In one other embodiment, the location is the front lobby of a building. In another embodiment, the Voice Message Sender Identity includes a calling party telephone number. In one embodiment, the calling party indicates the location based on information about the telephone service associated with the telephone number. In one embodiment, the telephone service is a residential telephone service; the location is a street address of the service subscription. In another embodiment, the telephone service is a mobile telephone service; the location is a street address of a wireless base station that serves the telephone call the Voice Message Sender 411 uses to send the Voice Message 480.

In one embodiment, Voice Message System 410 stores the Voice Message Record in Datastore 450. In one embodiment, Datastore 450 is a flash memory. In another embodiment, Datastore 450 is a hard disk. In yet another embodiment, Datastore 450 is a memory. In one other embodiment, Datastore 450 is a database. In one embodiment, Voice Message System 410 includes the Datastore 450.

FIG. 5 illustrates a process to record receiving information about a Voice Message.

When Voice Message System 510 receives a Voice Message 580 from a Voice Message Sender 511 for a Voice Message Recipient 519, Voice Message System 510 creates a Voice Message Record.

Voice Message System 510 includes Voice Message 580 in the Voice Message Record.

Voice Message System 510 includes a Voice Message Sender Identity of Voice Message Sender 511 in the Voice Message Record.

In one embodiment, Voice Message Sender 511 connects to Voice Message System 510 in a telephone call via a telephone system. In one embodiment, the telephone system provides Voice Message System 510 a telephone extension number of the telephone used in the connection. Voice Message System 510 includes the telephone extension number in the Voice Message Sender Identity. In one embodiment, Voice Message System 510 obtains a user name based on the telephone extension number. Voice Message System 510 includes the user name in the Voice Message Sender Identity. In another embodiment, the telephone system provides Voice Message System 510 the calling party telephone number of the telephone call. Voice Message System 510 includes the calling party telephone number in the Voice Message Sender Identity. In one embodiment, the telephone system provides Voice Message System 510 the caller identity of the telephone call. Voice Message System 510 includes the caller identity in the Voice Message Sender Identity. In one other embodiment, Voice Message System 510 prompts Voice Message Sender 511 for information about Voice Message Sender 511. Voice Message Sender 511 provides Voice Message System 510 the information. Voice Message System 510 includes the information in the Voice Message Sender Identity. In one embodiment, the information includes a user identity for the Voice Message Sender 511.

5

In another embodiment, Voice Message Sender **511** connects to Voice Message System **510** via an electronic message system. Voice Message Sender **511** sends Voice Message **580** in an electronic message. In one embodiment, the electronic message system provides Voice Message System **510** a sender identity of the electronic message.

Voice Message System **510** includes the sender identity in the Voice Message Sender Identity.

Voice Message System **510** includes a Voice Message Recipient Identity of Voice Message Recipient **519** in the Voice Message Record.

In one embodiment, Voice Message Sender **511** connects to Voice Message System **510** in a telephone call via a telephone system. In one embodiment, the telephone system provides Voice Message System **510** the digits the phone system receives for setting up the telephone call. Voice Message System **510** includes the received digits in the Voice Message Recipient Identity. In one embodiment, Voice Message System **510** maps the received digits to a telephone extension number. Voice Message System **510** includes the telephone extension number in the Voice Message Recipient Identity. In one embodiment, Voice Message System **510** obtains a user name based on the telephone extension number. Voice Message System **510** includes the user name in the Voice Message Recipient Identity. In another embodiment, Voice Message System **510** obtains a user name based on the received digits. Voice Message System **510** includes the user name in the Voice Message Recipient Identity. In one other embodiment, Voice Message System **510** prompts Voice Message Sender **511** for information about Voice Message Recipient **519**. Voice Message Sender **511** provides Voice Message System **510** the information. Voice Message System **510** includes the information in the Voice Message Recipient Identity. In one embodiment, the information includes a user identity for the Voice Message Recipient **519**.

In another embodiment, Voice Message Sender **511** connects to Voice Message System **510** via an electronic message system. Voice Message Sender **511** sends Voice Message **580** in an electronic message. In one embodiment, the electronic message system provides Voice Message System **510** a recipient identity of the electronic message. Voice Message System **510** includes the recipient identity in the Voice Message Recipient Identity.

Voice Message System **510** further includes a Voice Message Action Record in the Voice Message Record with Voice Message Action set to Action Receive. In one embodiment, Voice Message System **510** includes the current time of day in the Voice Message Action Time of the Voice Message Action Record. In one embodiment, Voice Message **580** is sent to more than one Voice Message Recipient. A Voice Message Action Record would then be created for the Voice Message received by each Voice Message Recipient.

In one embodiment, Voice Message System **510** stores the Voice Message Record in Datastore **550**. In one embodiment, Datastore **550** is a flash memory. In another embodiment, Datastore **550** is a hard disk. In yet another embodiment, Datastore **550** is a memory. In one other embodiment, Datastore **550** is a database. In one embodiment, Voice Message System **510** includes the Datastore **550**.

FIG. 6 illustrates a process to record listening information about Voice Message.

In one embodiment, a User **619** connects to Voice Message System **610**. User **619** submits to Voice Message System **610** an identity. In one embodiment, Voice Message System **610** selects from Datastore **650** a Voice Message Record with Voice Message Recipient Identity matching the submitted

6

identity, and that includes a Voice Message Action Record with Voice Message Action of Action Receive.

Voice Message System **610** updates the selected Voice Message Record with a Voice Message Action Record. The Voice Message Action Record has Voice Message Action set to Action Listen. In one embodiment, Voice Message System **610** updates the selected Voice Message Record after the Voice Message Record is selected. In one embodiment, Voice Message System **610** updates the selected Voice Message Record after User **619** listens to the Voice Message included in the selected Voice Message Record. In one embodiment, Voice Message System **610** includes in the Voice Message Action Time of the Voice Message Action Record the time of day when User **619** listens to the Voice Message. In one embodiment, Voice Message System **610** includes in the Voice Message Action Time of the Voice Message Action Record the time period during when User **619** listens to the Voice Message. In one embodiment, User **619** deletes the Voice Message after listening to the Voice Message. Voice Message System **610** includes a Voice Message Action Record in the Voice Message Record with Voice Message Action set to Action Delete. In one embodiment, User **619** forwards the Voice Message to another Voice Message Recipient. Voice Message System **610** includes a Voice Message Action Record in the Voice Message Record with Voice Message Action set to Action Forward. In one embodiment, Voice Message System **610** additionally creates a new Voice Message Record for the forwarded Voice Message with Voice Message Action Record set to Action Sent.

In one embodiment, when a User **619** wants to listen to a voice message, Voice Message System **610** selects a voice message that has not been listened to. In this embodiment, Voice Message System **610** selects from Datastore **650** a Voice Message Record that includes a Voice Message Recipient Identity matching the identity submitted by the User **619**, and that includes a Voice Message Action Record with Voice Message Action of Action Receive, and that does not include a Voice Message Action Record with Voice Message Action of Action Listen.

In another embodiment, when a User **619** wants to listen to a voice message, Voice Message System **610** selects a voice message even if the voice message has been listened to. Voice Message System **610** selects from Datastore **650** a Voice Message Record that includes a Voice Message Recipient Identity matching the identity submitted by the User **619**, and that includes a Voice Message Action Record with Voice Message Action of Action Receive. Each time the User **619** listens to the Voice Message included in the selected Voice Message Record, Voice Message System **610** adds a Voice Message Action Record to the selected Voice Message Record.

In one embodiment, Voice Message Action Record includes a User Action Attribute. In one embodiment, User Action Attribute includes information about the connection over which a User **619** listens to a voice message. In one embodiment, the information about the connection indicates the location where the User **619** listens to the voice message. In one embodiment, a User **619** connects to Voice Message System **610** in a telephone call via a telephone system to listen to a voice message. In one embodiment, the telephone system provides Voice Message System **610** a telephone extension number of the telephone used in the connection. Voice Message System **610** includes the telephone extension number in the User Action Attribute. In another embodiment, the telephone system provides Voice Message System **610** a calling party telephone number of the telephone call. Voice Message System **610** includes the calling party telephone number in

the User Action Attribute. In yet another embodiment, the telephone system provides Voice Message System 610 a caller identity of the telephone call. Voice Message System 610 includes the caller identity in the User Action Attribute.

In one embodiment, User Action Attribute includes the identity of a first User who listens to a voice message for a second User. In one embodiment, a first User connects to Voice Message System 610 to listen to a voice message. The first User submits to Voice Message System 610 an identity of the first User and an identity of a second User. Voice Message System 610 selects a Voice Message Record with Voice Message Recipient Identity matching the identity of the second User. Voice Message System 610 updates the selected Voice Message Record with a Voice Message Action Record. Voice Message System 610 includes the identity of the first User in the User Action Attribute. In this embodiment, a manager can delegate to her secretary to listen to her voice messages with proper recording of usage information.

In one embodiment, Voice Message System 610 stores the updated Voice Message Record in Datastore 650. In one embodiment, Datastore 650 is a flash memory. In another embodiment, Datastore 650 is a hard disk. In yet another embodiment, Datastore 650 is a memory. In one other embodiment, Datastore 650 is a database. In one embodiment, Voice Message System 610 includes the Datastore 650.

FIG. 7 illustrates a process of analyzing a plurality of Voice Message Records.

Voice Message System includes a Voice Message Analyzer 710. Voice Message Analyzer 710 connects to Datastore 750. Voice Message Analyzer 710 analyses a plurality of Voice Message Records regarding usage information. In one embodiment, the analysis answers a query. In one embodiment, the result of the analysis is for generating a report.

In one embodiment, Voice Message Analyzer 710 answers the query “Who has received a voice message from John Smith?” Voice Message Analyzer 710 selects from Datastore 750 all Voice Message Record with Voice Message Sender Identity that matches the name “John Smith”, and that includes a Voice Message Action Record with Voice Message Action of Action Receive. Voice Message Analyzer 710 extracts from the selected zero or more Voice Message Record the Voice Message Recipient Identity as the result of the analysis. In one embodiment, John Smith uses a plurality of telephones to send voice messages, Voice Message Analyzer 710 matches the Voice Message Sender Identity against a plurality of telephone numbers John Smith uses.

In one embodiment, Voice Message Analyzer 710 answers the query “Who has sent a voice message to telephone extension number 3325?” Voice Message Analyzer 710 selects from Datastore 750 all Voice Message Record with Voice Message Recipient Identity that matches telephone extension number “3325”, and that includes a Voice Message Action Record with Voice Message Action of Action Send. Voice Message Analyzer 710 extracts from the selected zero or more Voice Message Record the Voice Message Sender Identity as the result of the analysis.

In another embodiment, Voice Message Analyzer 710 retrieves a “list of voice messages being sent during the half hour before 3 p.m., Jun. 29, 2005, the closing time for the New York Stock Exchange.” Voice Message Analyzer 710 selects from Datastore 750 all Voice Message Record that includes a Voice Message Action Record with Voice Message Action Time between 2:30 p.m., and 3 p.m., on Jun. 29, 2005, and with Voice Message Action of Action Send. Voice Message Analyzer 710 retrieves from the selected zero or more Voice Message Record the Voice Message as the result of the analysis.

In one embodiment, Voice Message Analyzer 710 answers the query “Did Maria Anderson listen to a voice message from telephone number “408-234-5678” on Jul. 10, 2001?” Voice Message Analyzer 710 selects from Datastore 750 all Voice Message Record that includes Voice Message Recipient Identity matching the name “Maria Anderson” and Voice Message Sender Identity matching the telephone number “408-234-5678”, and that includes a Voice Message Action Record with Voice Message Action of Action Listen, and with Voice Message Action Time matching Jul. 10, 2001. If one or more Voice Message Record is selected, Voice Message Analyzer 710 indicates a “yes” as the result of the analysis. If no Voice Message Record is selected, Voice Message Analyzer 710 indicates a “no” as the result of the analysis.

In yet another embodiment, Voice Message Analyzer 710 retrieves a “list of senders who had mentioned the word “Enron” and “short sell” in a voice message he or she sent on Aug. 17, 2003?” Voice Message Analyzer 710 selects from Datastore 750 all Voice Message Record that includes Voice Message containing the audio patterns of “Enron” and “short sell”, and that includes a Voice Message Action Record with Voice Message Action of Action Send, and with Voice Message Action Time matching “Aug. 17, 2003”. Voice System retrieves from the selected zero or more Voice Message Record the Voice Message Sender Identity as the result of the analysis.

In one other embodiment, Voice Message Analyzer 710 answers the query “Among those who has listened to a voice message from John Smith on May 20, 2005, who has sent a voice message to the telephone number 408-222-3333 on May 20, 2005 or May 21, 2005?” Voice Message Analyzer 1010 selected from Datastore 750 a first group of Voice Message Record that includes Voice Message Sender Identity matching the name “John Smith” and that includes a Voice Message Action Record with Voice Message Action of Action Listen and with Voice Message Action Time matching “May 20, 2005”. Voice Message Analyzer 710 extracts the Voice Message Recipient Identity from the first group of Voice Message Record. Voice Message Analyzer 710 selects from Datastore 750 a second group of Voice Message Record that includes Voice Message Recipient Identity matching the telephone number “408-222-3333”, and that includes Voice Message Sender Identity matching one of the extracted Voice Message Recipient Identity, and that includes a Voice Message Action Record with Voice Message Action of Action Send and with Voice Message Action Time matching “May 20, 2005” or “May 21, 2005”. Voice Message Analyzer 710 retrieves from the second group of Voice Message Record the Voice Message Sender Identity as the result of the analysis.

In one embodiment, Voice Message Analyzer 710 retrieves a “list of all voice messages of Dave Leach’s family, where Dave’s family’s phone numbers are 408-123-3456, 650-233-4455, and 650-233-6890”. Voice Message Analyzer 710 selects from Datastore 750 a first group of Voice Message Record with Voice Message Recipient Identity that matches “Dave Leach”, and with Voice Message Sender Identity that matches one of Dave’s family’s phone numbers, and that includes a Voice Message Action Record with Voice Message Action of Action Receive. Voice Message Analyzer 710 further selects from Datastore 750 a second group of Voice Message Record with Voice Message Sender Identity that matches “Dave Leach”, and with Voice Message Recipient Identity that matches one of Dave’s family’s phone numbers, and that includes a Voice Message Action Record with Voice Message Action of Action Send. Voice Message Analyzer 710

retrieves from the first group and the second group of Voice Message Record the Voice Message as the result of the analysis.

In one embodiment, Voice Message Analyzer **710** retrieves “list of all voice messages that match a pattern of being sent to competitors within 24 hours of a board meeting.” Voice Message Analyzer **710** selects from Datastore **750** a group of Voice Message Records with Voice Message Recipient Identity that matches a list of competitors, with Voice Message Action Time within 24 hours of a date and time of a board meeting, and that includes a Voice Message Action of Action Sent. The Voice Message Analyzer **710** retrieves from this group of Voice Message Records the Voice Message Sender Identity.

The analysis illustrated in FIG. **7** represents examples regarding usage information. It will be evident to skilled in the art to formulate similar analysis in order to provide other results regarding usage information.

FIG. **8** illustrates a process of reporting on a plurality of Voice Message Records.

Voice Message System includes a Voice Message Reporter **830**. In one embodiment, Voice Message Reporter **830** instructs Voice Message Analyzer **810** to conduct an analysis. In one embodiment, Voice Message Reporter **830** instructs the Voice Message Analyzer **850** based on a Report Specification.

In one embodiment, a Report Specification is based on corporate usage policies. In another embodiment, a Report Specification is based on governmental usage regulations. In another embodiment, a Report Specification is based on public service usage policies.

In one embodiment, a Report Specification includes an analysis to be conducted in order to generate a report. In another embodiment, a Report Specification includes a format of a report. In yet another embodiment, a Report Specification includes a method to publish a report. In one other embodiment, a Report Specification includes timing information. In one embodiment, the timing information includes a scheduled time to generate a report, such as 5 pm on Jul. 26, 2005, daily at 6 am, or every hour during business days. In one embodiment, Voice Message Reporter **830** includes a clock. In one embodiment, Voice Message Reporter **830** instructs Voice Message Analyzer **810** to conduct an analysis included in a Report Specification when the time of day indicated by the clock matches the timing information in the Report Specification.

In one embodiment, Voice Message Reporter **830** connects to a Report Specification Datastore **890**. Report Specification **890** stores a plurality of Report Specification. In one embodiment, Voice Message Reporter **830** retrieves a Report Specification from Report Specification Datastore **890**. In one embodiment, Voice Message Reporter **830** instructs Voice Message Analyzer **810** to conduct the analysis included in the retrieved Report Specification. In one embodiment, Voice Message Reporter **830** receives the result of the analysis to generate a report. In one embodiment, Voice Message Reporter **830** generates the report based on the format and publishing method included in the Report Specification.

In another embodiment, an operator submits a Report Specification to Voice Message Reporter **830**. In one embodiment, Voice Message Reporter **830** instructs Voice Message Analyzer **810** to conduct the analysis included in the submitted Report Specification.

Foregoing described embodiments of the invention are provided as illustrations and descriptions. They are not intended to limit the invention to precise form described. In particular, it is contemplated that functional implementation

of invention described herein may be implemented equivalently in hardware, software, firmware, and/or other available functional components or building blocks, and that networks may be wired, wireless, or a combination of wired and wireless. Other variations and embodiments are possible in light of above teachings, and it is thus intended that the scope of invention not be limited by this Detailed Description, but rather by Claims following.

We claim:

1. A method for recording voice message usage information, comprising:

(a) receiving by a voice message system a voice message from a voice message sender for a voice message recipient;

(b) creating by the voice message system a first voice message record corresponding to the voice message and storing the first voice message record in a datastore, the datastore storing a plurality of voice message records, wherein the first voice message record comprises: the voice message, a voice message sender identity for the voice message sender, a voice message recipient identity for the voice message recipient, at least a first voice message action record recording a send action for the voice message, and a sending time comprising a time when the voice message sender sends the voice message;

(c) creating by the voice message system a second voice message record corresponding to the voice message and storing the second voice message record in the datastore, the second voice message record comprising: the voice message, the voice message sender identity for the voice message sender, the voice message recipient identity for the voice message recipient, at least a second voice message action record recording a receive action for the voice message, and a current time comprising a time when the receive action occurs;

(d) receiving an identity from a user by the voice message system;

(e) determining by the voice message system that the second voice message record comprises the voice message recipient identity matching the received identity and the second voice message action record recording the receive action for the voice message; and

(f) updating by the voice message system the second voice message record with a third voice message action record recording a listen action for the voice message.

2. The method of claim **1**, wherein the voice message sender identity of the first voice message record comprises one or more of the following:

a telephone number of a telephone used to submit a voice message;

a user name based on the telephone number;

a calling party telephone number;

a calling party identity;

information concerning the voice message sender obtained from the voice message sender; and

a sender identity for an electronic message containing the voice message.

3. The method of claim **1**, wherein the voice message recipient identity of the second message record comprises:

a user name based on a telephone number dialed by the voice message sender when sending the voice message.

4. The method of claim **1**, wherein the determining (e) comprises:

(e1) determining by the voice message system that the second voice message record comprises the voice message recipient identity that matches the received identity

11

and does not comprise any voice message action records recording the listen action for the voice message.

5. The method of claim 1, wherein the updating (f) comprises:

(f1) updating by the voice message system the second voice message record with the third voice message action record recording the listen action for the voice message after the user listens to the voice message in the second voice message record, the third voice message action record comprising a time when the user listens to the voice message.

6. The method of claim 5 wherein the second voice message action record further comprises a user attribute, wherein the user attribute comprises one or more of the following:

a connection over which the user listens to the voice message in the second voice message record;

a location from where the user listens to the voice message; a telephone from where the user listens to the voice message;

a calling party telephone number from where the user listens to the voice message; and

a calling party identity based on the calling party telephone number.

7. The method of claim 1, further comprising:

(g) receiving by the voice message system a query concerning the plurality of voice message records, wherein the query comprises one or more audio patterns; and

(h) selecting by the voice message system one or more voice message records of the plurality of voice message records comprising a voice message comprising the audio patterns and comprising a voice message action record recording a send action for the voice message.

8. The method of claim 7, wherein the voice message record further satisfies the query if it matches one or more of the following:

a voice message sender identity submitted in the query; a voice message recipient identity submitted in the query; and

a voice message action record submitted in the query.

9. The method of claim 7, further comprising:

(i) conducting an analysis of the selected plurality of voice message records based on a report specification.

10. The method of claim 9, wherein the report specification comprises one or more of the following:

a format of the report;

a method for publishing the report; and timing information for generating the report.

11. The method of claim 9, wherein the report specification is based on corporate usage policies, governmental usage policies, or public service policies.

12. The method of claim 1, further comprising:

(g) determining by the voice message system that the voice message of the second voice message record is deleted; and

(h) updating by the voice message system the second voice message record with a fourth voice message action record recording a delete action for the voice message, the fourth voice message action record comprising a time when the delete action occurs.

13. The method of claim 1, further comprising:

(g) determining by the voice message system that the voice message of the second voice message record is forwarded by the voice message recipient to another voice message recipient; and

(h) updating by the voice message system the second voice message record with a fourth voice message action record recording a forward action for the voice message,

12

the fourth voice message action record comprising a time when the forward action occurs.

14. The method of claim 13, further comprising:

creating by the voice message system a third voice message record corresponding to the forwarded voice message, wherein the third voice message record comprises: the forwarded voice message,

a second voice message sender identity comprising the voice message recipient identity,

a second voice message recipient identity for the other voice message recipient, and

another voice message action record recording a send action for the forwarded voice message, the other voice message action record comprising a time when the send action for the forwarded voice message occurs.

15. The method of claim 1, wherein the second voice message action record further comprises a user attribute, wherein the receiving (d), the selecting (e), and the updating (f) comprise:

(d1) receiving from a first user by the voice message system a first user identity for the first user and a second user identity for a second user;

(e1) determining by the voice message system that the second voice message record comprises the voice message recipient identity matching the second user identity and the second voice message action record recording the receive action for the voice message; and

(f1) updating the second voice message record with the third voice message action record recording the listen action for the voice message and setting the user attribute of the third action record to the first user identity, the third voice message action record comprising a time when the first user listens to the voice message.

16. The method of claim 1, wherein the voice message sender identity of the first voice message cord comprises a location of the voice message sender at the sending time.

17. A system, comprising:

a datastore storing a plurality of voice message records; and

a voice message system, wherein the voice message system:

receives a voice message from a voice message sender for a voice message recipient,

creates a first voice message record corresponding to the voice message and storing the first voice message record in the database, wherein the first voice message record comprises: the voice message, a voice message sender identity for the voice message sender, a voice message recipient identity for voice message recipient, at least a first voice message action record recording a send action for the voice message, and a sending time comprising a time when the voice message sender sends the voice message,

creates a second voice message record corresponding to the voice message and storing the second voice message record in the datastore, the second voice message record comprising: the voice message, the voice message sender identity for the voice message sender, the voice message recipient identity for the voice message recipient, at least a second vice message action record recording a receive action for the voice message, and a current time comprising a time when the receive action occurs,

receive an identity from a user,

determines that the second voice message record comprises the voice message recipient identity matching

13

the received identity and the second voice message action record recording the receive action for the voice message, and

updates the second voice message record with a third voice message action record recording a listen action for the voice message.

18. The system of claim 17, wherein the voice message sender identity of the first voice message record comprises one or more of the following:

a telephone number of a telephone used to submit a voice message;

a user name based on the telephone number;

a calling party telephone number;

a calling party identity;

information concerning a voice message sender obtained from the voice message sender; and

a sender identity of an electronic message containing the voice message.

19. The system of claim 17, wherein the voice message recipient identity of the second voice message record comprises:

a user name based on a telephone number dialed by the voice message sender when sending the voice message.

20. The system of claim 17, further comprising a voice message analyzer for analyzing the plurality of voice message records, wherein the voice message system further:

receives a query concerning the plurality of voice message records, wherein the query comprises one or more audio patterns; and

selects one or more of the voice message records of the plurality of voice message records comprising the voice message comprising the audio patterns and comprising the voice message action record recording a send action for the voice message.

21. The system of claim 20, further comprising a voice message reporter for generating reports on an analysis by the voice message analyzer.

22. The system of claim 17, wherein the voice message system further:

determines that the second voice message record comprises the voice message recipient identity that matches the received identity and does not comprise any voice message action records recording the listen action for the voice message.

23. The system of claim 17, wherein the voice message system further:

updates the second voice message record with the third voice message action record recording the listen action for the voice message action after the user listens to the voice message in the second voice message record, the third voice message action record comprising a time when the user listens to the voice message.

24. The system of claim 17, wherein the voice message system further:

determines that a voice message of the second voice message records is deleted; and

updates the second voice message record with a fourth voice message action record recording a delete action for the voice message, the fourth voice message action record comprising a time when the delete action occurs.

25. The system of claim 17, wherein the voice message system further:

determines that the voice message of the second voice message record is forwarded by the voice message recipient to another voice message recipient; and

14

updates the second voice message record with a fourth voice message action record recording a forward action for the voice message, the fourth voice message action record comprising a time when the forward action occurs.

26. The system of claim 25, wherein the voice message system further:

creates a third voice message record corresponding to the forwarded voice message, wherein the third voice message record comprises:

the forwarded voice message,

a second voice message sender identity comprising the voice message recipient identity,

a second voice message recipient identity for the other voice message recipient, and

another voice message action record recording a send action for the forwarded voice message, the other voice message action record comprising a time when the send action for the forwarded voice message occurs.

27. The system of claim 17, wherein the second voice message action record further comprises a user attribute, wherein the voice message system further:

receives from a first user a first user identity for the first user and a second user identity for a second user;

determines that the second voice message record comprises the voice message recipient identity matching the second user identity and the second voice message action record recording the receive action for the voice message; and

updates the second voice message record with the third voice message action record recording the listen action for the voice message and setting the user attribute of the third action record to the first user identity, the third voice message action record comprising a time when the first user listens to the voice message.

28. The system of claim 17, wherein the voice message sender identity of the first voice message cord comprises a location of the voice message sender at the sending time.

29. A method for recording voice message usage information, comprising:

(a) receiving by a voice message system a voice message from a voice message sender for a voice message recipient;

(b) storing by the voice message system a first voice message record corresponding to the voice message, wherein the first voice message record comprises: the voice message, a voice message sender identity, a voice message recipient identity, a voice message send action record, and a time when the voice message sender sent the voice message;

(c) storing by the voice message system a second voice message record corresponding to the voice message, the second voice message record comprising: the voice message, the voice message sender identity, the voice message recipient identity, a voice message receive action record, and a current time;

(d) determining by the voice message system that the second voice message record comprises the voice message recipient identity matching an identity received from a user and the voice message receive action record; and

(e) updating by the voice message system the second voice message record with a voice message listen action record.