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Itzhack [IL/IL]; 9 Yarkon Street, 77 703 Ashdod (IL).
HENDLER, Ofer [IL/IL]; 49a HaGalil Street, 42 235 Kfar-Saba (IL).

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(74) Agent: G. E. EHRLICH (1995) LTD.; 11 Menachem Begin Street, 52 521 Ramat-Gan (IL).

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(71) Applicant (*for all designated States except US*): NOATEL LTD. [IL/IL]; 49a HaGalil Street, 42 235 Kfar-Saba (IL).

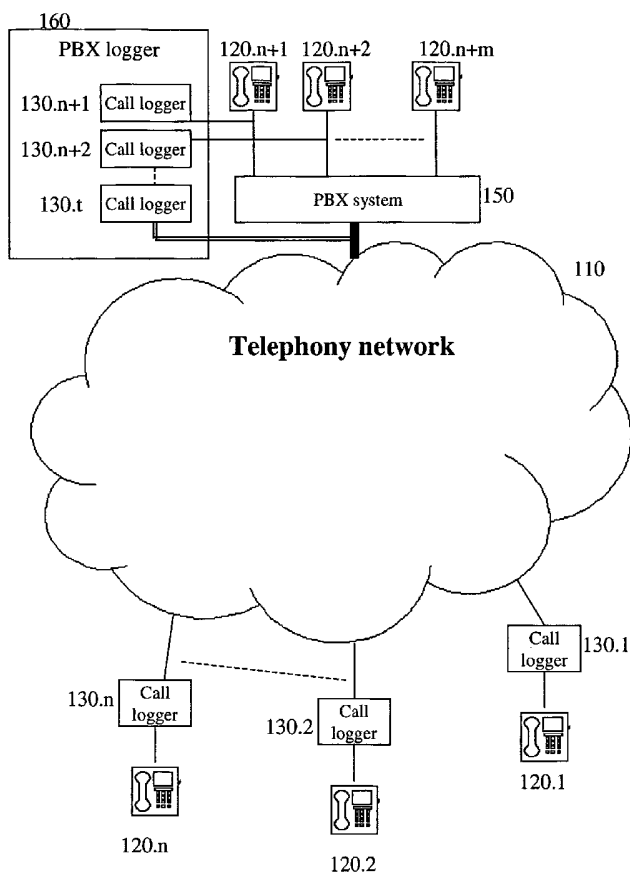
(72) Inventors; and

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(75) Inventors/Applicants (*for US only*): HENDLER,

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(54) Title: AN APPARATUS AND METHOD FOR REMOTELY RECORDING SELECTED CALLS



(57) Abstract: A remotely located call recording apparatus, records telephone calls connected over a network. The network supports a plurality of independent subscribers. The call recording apparatus contains an interface element, an interaction element, and a recording element. The interface element interfaces with the external telephone network. The interaction element receives user commands regarding recording calls to and/or from their respective terminal devices. The recording element records telephone calls of a respective one of the plurality of subscribers in accordance with received user commands.

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AN APPARATUS AND METHOD FOR REMOTELY RECORDING SELECTED CALLS

FIELD AND BACKGROUND OF THE INVENTION

5 The present embodiments relate to a network-based call recording apparatus and, more particularly, to a network-based call recording apparatus with the ability to perform selective recording of calls according to predefined rules or on demand. The present embodiments enable establishing a network-based call recording service within a telephony network.

10

Telephone call recording and monitoring systems are increasingly being used by businesses and private users, for recording and replaying telephone conversations. A call recording can help resolve disputes over what was or was not said during a telephone call, or whether the call ever took place. Businesses, such as a financial
15 institution, can record sensitive calls as evidence of the call details. In other cases, call recording is done on an ongoing basis.

Currently, private users use special telephone recorder devices that tap the user's telephone or handset line, and are turned on and off manually. Law enforcement and government agencies may be authorized to connect call loggers at
20 the network level, but these loggers are limited in the number of calls that can be recorded and are not available for control by the subscriber. The business recording market is at present dominated by CPE (customer premise equipment) that basically tap the trunks of the private branch exchanges (PBX).

Reference is now made to Fig. 1, which illustrates the current CPE solution for
25 call recording. Telephony network 110 provides telephony services to single line connections (120.1 to 120.n) and to PBX system 150 serving multiple users. In order to record a call from a given line, a call logger 130.x must be connected to each line. PBX logger 160 essentially contains a call logger 130.x for each telephone line, or for each trunk 130.t. For users who desire to record calls on a large number of lines, the
30 on-site solution requires a significant investment in purchasing, handling, and maintenance of equipment.

Network-based recording solutions do exist, however they are based on a special leading number that the user dials before providing the real destination number. This solution is limited because it is useful only for outgoing calls, and it is based on the fact that the user knows in advance that he would like to record the call.

5 Another type of network based recording solution is for the Call-Center market. This network-based solution is limited to a small amount of destination numbers (the call center numbers), and cannot provide the service to the whole public.

In U.S. Pat. No. 5,774,531 Johnson provides a telecommunications system and method for automatic call processing for inbound and outbound calls to arbitrary
10 delegates. The call processing is performed at the network level. The system includes a database having a computer-readable file of user journals corresponding to telephone numbers of service subscribers. Each journal has lists of inbound and outbound telephone numbers associated with calls made to/from a particular telephone of the service subscriber. In addition, the user journal includes a list
15 specifying telephone numbers of third-party subscribers who are authorized to perform various call processing operations on the inbound and outbound lists of the subscriber. Johnson does not provide an audio-channel connection to the system. The system therefore cannot record calls, but can only perform database-related services such as browsing through the user's inbound and outbound lists, and auto-dialing a
20 number on the list.

Another limitation of current recording systems is that they provide limited options for performing selective call recording. A call logger located on a single phone line can either record all incoming and outgoing calls, or be turned on and off manually by the caller. Call loggers for facilities with multiple lines may provide
25 limited options for rule-based selection of calls to be recorded, but call recording cannot be turned on and off by the user during the call. In U.S. Pat. No 6,072,860 Kek, et al. describe a telephone apparatus with recording of phone conversations on massive storage. The telephone apparatus provides service to a plurality of telephones located at a particular facility, and has the capability of controlling the
30 connection of calls to such telephones as well as recording selected phone conversations. In particular, control of call connection is accomplished with access control data that is phone-related and PIN number-related. Just before the call is

connected, following the successful completion of a validation check to determine that the caller is authorized to place the call, the recording system determines whether this call should be recorded. Recording control data is provided to the recording system from the file server, where it was previously stored by the workstation, and
5 this data is compared with the call-related data (e.g., the origination number, PIN number, destination number). If the conditions set by the recording control data are met, then the conversation is recorded. Johnson provides rule-based selection of which calls are recorded, but does not enable the caller to request that a particular call be recorded. Additionally, the decision to record a call is made before the connection
10 is established. There is no provision for initiating call recording at a selected time in the middle of the call.

There is thus a widely recognized need for, and it would be highly advantageous to have, a call recording apparatus and method devoid of the above
15 limitations.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a
20 remotely located call recording apparatus, which records telephone calls connected over a network. The network supports a plurality of independent subscribers. The call recording apparatus contains an interface element, an interaction element, and a recording element. The interface element interfaces with the external telephone network. The interaction element receives user commands regarding recording calls to and/or from their respective terminal devices. The recording element records
25 telephone calls of a respective one of the plurality of subscribers in accordance with received user commands.

Preferably, the interface element contains an audio manager that handles audio telephony signals.

Preferably, the audio manager routes a call received from the network via the
30 call recording apparatus to a respective destination terminal device.

Preferably, the audio manager forwards a call to a specified network switch.

Preferably, the audio manager connects a specified call to an internal audio bus of the call recording apparatus.

Preferably, the audio manager makes an outgoing call to a specified destination terminal device.

5 Preferably, the audio manager connects a call received from the network to the outgoing call.

Preferably, the interface element contains a conference manager that ensures connection of the call recording apparatus as a third party to a specified call.

10 Preferably, the conference manager instructs a network switch to add the call recording apparatus as a third party to the specified call.

Preferably, upon receipt of a mid-call recording trigger, the conference manager calls a terminal device associated with the trigger.

Preferably, the interface element contains a signaling manager, for communicating with the network over a signaling channel.

15 Preferably, the signaling manager instructs the network to direct specified telephone calls to the call recording apparatus.

Preferably, the signaling manager receives mid-call events from a switch with intelligent telephony network (IN) capabilities.

20 Preferably, the communicating conforms to a Signaling System 7 (SS7) protocol.

Preferably, the communicating conforms to an ISDN User Part (ISUP) protocol.

Preferably, the signaling manager queries a cellular network Home Location Register (HLR).

25 Preferably, the signaling manager contains a proxy HLR.

Preferably, the network is a cellular telephony network.

Preferably, the network is a public switched telephone network (PSTN).

Preferably, the telephony network provides selectively available telephony services.

30 Preferably, the network supports an intelligent network (IN).

Preferably, the network supports an advanced intelligent network (AIN).

Preferably, the interaction element contains a call filter for performing rule-based selection of calls for recording.

Preferably, the selecting is performed in accordance with a state of at least one call-related parameter.

5 Preferably, the call-related parameter is a respective originating terminal device.

Preferably, the call-related parameter is a respective destination terminal device.

10 Preferably, the call filter determines the call-related parameter from an ISUP-based message associated with the call.

Preferably, the ISUP-based message is an Initial Address Message (IAM).

Preferably, the call filter determines the call-related parameter from an HLR query associated with the call.

15 Preferably, the call filter determines the call-related parameter from information received from a telephony network providing selectively available telephony services.

Preferably, the interaction element detects a recording trigger received from one of the subscribers

Preferably, the recording trigger is a mid-call trigger.

20 Preferably, the interaction element contains a triggerer for sending a recording event associated with a specified audio channel to the recording element.

Preferably, the interaction element further contains a triggerer for sending to the recording element a recording event associated with an audio channel specified by the call filter.

25 Preferably, the interaction element further contains a triggerer for sending to the recording element a recording event for an audio channel associated with the recording trigger.

Preferably, the recording event is for instructing the recording element to start recording the specified audio channel.

30 Preferably, the recording event is for instructing the recording element to stop recording the specified audio channel.

Preferably, the interaction element contains a database for holding user profiles.

Preferably, a user profile contains recording rules associated with the user.

Preferably, a user profile contains user authentication information.

5 Preferably, the interaction element contains an Interactive Voice Response (IVR) system.

Preferably, the interaction element identifies a user, and verifies the user's authority to request a service.

10 Preferably, the interaction element receives signals over the audio channel of a connected call.

Preferably, the interaction element contains a dual-tone multi-frequency (DTMF) sequence detection unit.

Preferably, the interaction element contains a data interface for communicating with a data network.

15 Preferably, the call recording apparatus further contains an internal library for storing call recordings.

Preferably, the call recording apparatus further contains a storer for transferring a recording from the recording element to a storage element.

Preferably, the storage element consists of an external storage device.

20 Preferably, the storage element consists of an internal library.

Preferably, the storage element is incorporated within a Voice Mail system.

Preferably, the call recording apparatus further contains an accessor for accessing stored recordings from a storage element.

25 Preferably, the accessor accesses a recording from temporary storage in the recording element.

Preferably, the accessor accesses the recording from the internal library.

Preferably, the accessor provides an accessed recording to a play-back unit.

Preferably, the accessor locates a stored recording in accordance with an identifier associated with the stored recording.

30 Preferably, the interaction element contains a play-back unit for playing back a recording.

Preferably, the play-back unit plays back a recording over a telephony audio channel.

Preferably, the play-back unit plays back a recording by voice-streaming over a data channel.

5 Preferably, the interaction element contains a transferrer for transferring a recording to a physical medium.

Preferably, the interaction element contains a user notifier for sending a message containing information of a recorded call to a subscriber.

10 Preferably, the recording element contains a command processor, for receiving recording events from the interaction element, a channel manager, for recording specified channels of an internal audio bus, and a temporary storage element, for providing temporary storage of a recorded channel.

Preferably, the recording element associates an identifier with a call recording.

Preferably, the identifier is a numerical identifier.

15 Preferably, the identifier is a voice identifier.

Preferably, the call recording apparatus is located in a single site, for centralized recording of network telephony traffic.

Preferably, the call recording apparatus is located in multiple locations, each of the locations recording a local portion of network telephony traffic.

20 Preferably, the call recording apparatus is hosted on a Voice Mail infrastructure.

According to a second aspect of the present invention there is provided a system for recording telephone calls over a telephony network. The system contains the telephony network and a call recording apparatus. The network supports a plurality of independent subscribers. The call recording apparatus contains an interface element, an interaction element, and a recording element. The interface element interfaces with the external telephone network. The interaction element receives user commands regarding recording calls to and/or from their respective terminal devices. The recording element records telephone calls of a respective one of the plurality of subscribers in accordance with received user commands.

30 Preferably, the interface element contains an audio manager for handling audio telephony signals.

Preferably, the audio manager routes a call via the call recording apparatus to a respective destination terminal device.

Preferably, the audio manager connects a specified call to an internal audio bus.

5 Preferably, the audio manager makes an outgoing call from the call recorder to a respective destination subscriber of a received call, and links the received and outgoing calls.

Preferably, the interface element contains a conference manager operable to ensure connection of the call recording apparatus as a third party to a specified call.

10 Preferably, the interface element contains a signaling manager for communicating with the network over a signaling channel.

Preferably, the signaling manager instructs the network to direct specified calls to the call recording apparatus.

Preferably, the network is a cellular telephony network.

15 Preferably, the network is a public switched telephone network (PSTN).

Preferably, the network is a telephony network operable to provide selectively available telephony services.

Preferably, the interaction element contains a call filter for performing rule-based selection of calls for recording.

20 Preferably, the selecting is performed in accordance with a state of at least one call-related parameter.

Preferably, the interaction element detects a recording trigger received from one of the subscribers

Preferably, the recording trigger is a mid-call trigger.

25 Preferably, the interaction element contains a triggerer for sending a recording event associated with a specified audio channel to the recording element.

Preferably, the recording event is for instructing the recording element to start recording the specified audio channel.

30 Preferably, the interaction element contains a database for holding user profiles.

Preferably, the recording element associates an identifier with a call recording.

Preferably, the interaction element contains an IVR system.

Preferably, the interaction element identifies a user and verifies the user's authority to request a service.

Preferably, the interaction element contains a DTMF sequence detection unit.

Preferably, the interaction element contains a data interface for
5 communicating with a data network.

Preferably, the system for recording telephone calls further contains an internal library for storing call recordings.

Preferably, the system for recording telephone calls further contains a storer for storing a recording within a storage device.

10 Preferably, the system for recording telephone calls further contains an accessor for accessing recordings from a storage device.

Preferably, the system for recording telephone calls further contains a play-back unit for playing back a recorded copy of a call.

15 Preferably, the system for recording telephone calls further contains a transferrer for transferring a recording to a physical medium.

Preferably, the recording element contains a command processor, for receiving recording events from the interaction element, a channel manager, for recording specified channels of an internal audio bus, and a temporary storage element, for providing temporary storage of a recorded channel.

20 Preferably, the call recording apparatus is located in a single site, for centralized recording of network telephony traffic.

Preferably, the call recording apparatus is located in multiple locations, each of the locations recording a portion of network telephony traffic.

25 According to a third aspect of the present invention there is provided a system for remotely providing a service to selected telephone calls connected over a telephony network. The system contains the telephony network and a call servicing apparatus. The call servicing contains a call processor, for servicing a call, an interface element, for ensuring a connection of specified calls to the call processor, a call filter, for selecting from the specified calls, and a triggerer, for controlling the call
30 processor to service the selected calls.

Preferably, the interface element routes a call via the call servicing apparatus to a respective destination terminal device.

Preferably, the interface manager makes an outgoing call to a respective destination subscriber of a connected call, and links the connected and the outgoing calls.

5 Preferably, the interface manager ensures the connection of the call servicing apparatus as a third party to a specified call.

Preferably, the interface manager instructs a network to direct the specified calls to the call servicer.

Preferably, the call filter performs rule-based selection, in accordance with a state of at least one call-related parameter.

10 Preferably, the call filter performs the selecting in accordance with a state of at least one call-related parameter.

Preferably, the system for remotely providing a service to selected telephone calls further contains an interaction element, for receiving commands from subscribers regarding service provision.

15 According to a fourth aspect of the present invention there is provided a system for remotely providing a service to specified telephone calls connected over a telephony network. The system contains the telephony network and a call servicing apparatus. The call servicing contains a call processor, for servicing a call, an interface element, for ensuring a connection of specified calls to the call processor, a
20 specifier, for specifying a call in response to a command received from a respective subscriber, and a triggerer, for controlling the call processor to service the selected calls.

Preferably, the command is received during the respective call.

25 Preferably, the interface manager ensures connection of the call servicing apparatus as a third party to a specified call.

Preferably, the interface manager routes a call via the call servicing apparatus to a respective destination terminal device.

30 Preferably, the system for remotely providing a service to specified telephone calls contains an interaction element, for receiving commands from subscribers regarding service provision.

According to a fifth aspect of the present invention there is provided a method for remotely recording selected telephone calls connected over a telephony network.

The method consists of the following steps: ensuring an audio-channel connection of specified calls connected over the network to a recording element, receiving the audio channel of the specified calls, selecting calls for recording, and recording the selected calls.

5 Preferably, the ensuring includes receiving incoming calls from the network.

 Preferably, the ensuring includes forwarding a received call to a respective destination subscriber.

 Preferably, the ensuring includes making an outgoing call to a respective destination subscriber of a received call, and linking the received and the outgoing
10 calls.

 Preferably, the ensuring includes connecting to a call as a third party.

 Preferably, the ensuring includes instructing the network to perform the connecting.

 Preferably, the selecting is rule-based, in accordance with a state of at least
15 one call-related parameter.

 Preferably, the method contains the further step of establishing a set of rules for performing the selecting.

 Preferably, the method contains the further step of starting the recording upon receipt of a first trigger signal.

20 Preferably, the method contains the further step of ending the recording upon receipt of a second trigger signal.

 Preferably, the first trigger signal is received prior to the call.

 Preferably, the first trigger signal is received during the call.

 Preferably, the first trigger signal is one of a group of signals consisting of: a
25 signal transmitted over the voice channel of a connected call, a DTMF signal, and a data signal.

 Preferably, the specified calls originate from a specified telephony subscriber.

 Preferably, the specified calls are destined for a specified telephony subscriber.

30 Preferably, the specified calls are identified by a subscriber.

 Preferably, the method contains the further step of forwarding a call to a destination subscriber.

Preferably, the method contains the further step of associating an identifier with a recorded copy of a call.

Preferably, the method contains the further step of playing back a recorded copy of a call.

5 Preferably, the method contains the further step of storing a recorded copy of a call within an internal library.

Preferably, the method contains the further step of storing a recorded copy of a call in a Voice Mail system.

10 Preferably, the method contains the further step of accessing a recorded copy of a call from the internal library.

Preferably, the method contains the further step of locating a recorded copy of a call within the internal library by an identifier associated with the copy.

Preferably, the method contains the further step of transferring a recorded copy of a call to a physical medium.

15 Preferably, the method contains the further step of sending a message containing information of a recorded call to a specified subscriber.

According to a sixth aspect of the present invention there is provided a method for remotely providing a service to selected telephone calls connected over a telephony network. The method consists of the following steps: ensuring a
20 connection of specified calls connected over the network to a call processing element, receiving the specified calls, selecting calls for service provision, and providing the service to the selected calls.

Preferably, the ensuring includes receiving the voice channel of the specified calls.

25 Preferably, the ensuring includes receiving the data channel of the specified calls.

Preferably, the ensuring includes receiving incoming calls from the network.

Preferably, the ensuring includes forwarding a received call to a respective destination subscriber.

30 Preferably, the ensuring includes making an outgoing call to a respective destination subscriber of a received call, and linking the received and the outgoing calls.

Preferably, the ensuring includes connecting to a call as a third party.

Preferably, the ensuring includes instructing the network to perform the connecting.

5 Preferably, the selecting is rule-based, in accordance with a state of at least one call-related parameter.

Preferably, the selecting is performed to select a call specified by a user.

Preferably, the method contains the further step of starting the recording upon receipt of a trigger signal.

Preferably, the trigger signal is received prior to the call.

10 Preferably, the trigger signal is received during the call.

The present invention successfully addresses the shortcomings of the presently known configurations by providing a network-based call recording apparatus, which can record selected calls without requiring the user to provide on-site call logger
15 equipment.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar or equivalent
20 to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

Implementation of the method and system of the present invention involves
25 performing or completing selected tasks or steps manually, automatically, or a combination thereof. Moreover, according to actual instrumentation and equipment of preferred embodiments of the method and system of the present invention, several selected steps could be implemented by hardware or by software on any operating system of any firmware or a combination thereof. For example, as hardware, selected
30 steps of the invention could be implemented as a chip or a circuit. As software, selected steps of the invention could be implemented as a plurality of software instructions being executed by a computer using any suitable operating system. In

any case, selected steps of the method and system of the invention could be described as being performed by a data processor, such as a computing platform for executing a plurality of instructions.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of
10 illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the
15 invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

In the drawings:

Fig. 1 illustrates the current customer premise equipment (CPE) solution for call recording.

20 Fig. 2 is a simplified block diagram of a telephony network with a remote call recording apparatus, according to a preferred embodiment of the present invention.

Fig. 3 is a simplified block diagram of a remote call recording apparatus, according to a preferred embodiment of the present invention.

25 Fig. 4 is a simplified block diagram of an interface element, according to a preferred embodiment of the present invention.

Fig. 5 is a simplified block diagram of an interaction element, according to a preferred embodiment of the present invention.

Fig. 6 is a simplified block diagram of a recording element, according to a preferred embodiment of the present invention.

30 Figs. 7-10 illustrate call flow scenarios.

Fig. 11 is a simplified block diagram of a call recording apparatus, according to a preferred embodiment of the present invention.

Fig. 12 shows an example of a high-level network layout.

Fig. 13 is a simplified flowchart of a method for selectively recording calls connected over a telephony network, according to a preferred embodiment of the present invention.

5 Fig. 14 is a simplified block diagram of a telephony network with a remote call servicing apparatus, according to a preferred embodiment of the present invention.

Figs. 15 is a simplified block diagram of a system for remote call servicing, according to a preferred embodiment of the present invention.

10 Fig. 16 is a simplified flowchart of a method for selectively providing a service to calls connected over a telephony network, according to a preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

15

Currently available call recording devices are located at the customer premises, and generally serve to record calls for a single telephone. Recording conversations on several telephone devices in a single premise requires significant duplication of equipment. Business users may connect a recorder at a central private switch, but recording calls for many users requires a relatively complex system. The present embodiments describe a network-based call recording apparatus, which records audio signals connected over the telephony network to a call recording apparatus. Once connected to the call recording apparatus, the calls can be recorded. The customer can specify which calls should be recorded, either in advance or during the course of the call. Call recording can be performed for all calls connected over the network, without requiring any recording equipment at the customer premises.

A simple method for recording telephone calls can be of great benefit to users. Any person can use the recorded media as evidence in cases where there is disagreement or dispute about a call details. Since the recording has been done by neutral entity (the carrier), there is no suspicion of fraud or faked recording. Businesses can monitor the performance of call-center agents. Financial institutions can maintain a record of customer instructions for financial transactions, for example

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a call to a stock trader. Businesses in industries where deals are closed over the phone, such as the diamond industry, can keep track of their obligations. News reporters and journalists can record interviews using a cellular telephone as a recording device. The preferred embodiments described below, enable provision of recording and other services to users at the network level, and remove the need for network users to acquire and maintain the equipment required for on-site recording.

The principles and operation of a network-based telephone call recording apparatus according to the present embodiments may be better understood with reference to the drawings and accompanying descriptions.

Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting.

The present embodiments provide a call recording apparatus, which can record telephone calls without requiring any equipment at the user's site. Call recording services can be provided to subscribing users, allowing the user to specify which calls should be recorded, and to start and stop recording a call on demand. The call recording apparatus connects directly to the call's audio path via the telephone network, not to an individual line or trunk. The call recording apparatus interfaces directly with the telephony network to ensure that the audio path signal reaches the call recording apparatus. The call recording apparatus can connect to the audio path between the two calling parties, by forwarding the call via the call recording apparatus, or can connect to the audio path as a third party.

Although the call recording apparatus is network-based, calls are recorded selectively. A user can define recording rules for the call recording apparatus, in accordance with various call parameters. The call recording apparatus can then check all calls that are connected through the call recording apparatus, to determine if they fulfill any user-defined rules, and record those calls that fulfill a recording rule. Alternately, the call recording apparatus can be triggered to record a specific call by

user-provided trigger signals, as described below. Recorded calls can be stored in the network Voice Mail system, or other storage device, for later playback through the Voice Mail system.

Reference is now made to Fig. 2, which is a simplified block diagram of a telephony network with a remote call recording apparatus, according to a preferred embodiment of the present invention. Call-recorder 200 is connected to telephony network 210, and may be located on either a dedicated server or on one or more network servers. Calls between users 220.1 to 220.n are connected over network 210. As described below, an audio path connection is made to call recording apparatus 200 for each recorded call. After the call is recorded, the recording is made available to the user. The network may be any type of telephony network, including Public Switched Telephone Network (PSTN) networks, both Incumbent Local Exchange Carrier (ILEC) and Competitive Local Exchange Carrier (CLEC), and cellular networks.

Call recording apparatus 200 interfaces with network 210 to ensure an audio path connection to the call, either while the connection is being established or during the call. Call recording apparatus 200 also interacts with users, so that users can control the recording process, for example by specifying rules for which of their calls should be recorded. The call may be recorded in its entirety, or mid-call commands may be provided to start and stop call recording during the call. The present embodiments allow a single call recording apparatus 200 to record calls between any of the telephones 210.1 to 210.n connected to the network, without requiring additional equipment at the user facility. Call recording can be performed automatically, using a rule-based system to select which calls are recorded, and/or on a per-call basis, depending on network capabilities and subscriber preferences.

Call recording apparatus 200 makes recording services available to users (both personal and business) who wish to record calls, without requiring customer-site equipment. Users may record their own incoming and/or outgoing calls, and may be authorized to record calls on other lines as well. All services may be provided without changing the behavior of users in making and receiving calls. Recording services may be provided in silent mode (the other party cannot tell that he is being recorded) or non-silent mode (both parties are aware that a call is being recorded). An

Interactive Voice Response (IVR) messaging system may be used to receive the consent of both parties for recording the call. Instant playback services may allow users to replay the recent call at the end of the call, without the need to make another call. The existing hosted Voice Mail (or Unified Messaging) system may be used to
5 store the recorded media and to provide playback services.

For simplicity, the following preferred embodiments describe call recording for a single call. It is to be understood that the following preferred embodiments apply, without loss of generality, to the processing of multiple calls. All call recording apparatus elements are capable of processing multiple concurrent calls.

10 Reference is now made to Fig. 3, which is a simplified block diagram of a remote call recording apparatus, according to a preferred embodiment of the present invention. Telephony network 305 provides telephony services to a group of independent subscribers. Call recording apparatus 300 is located remotely from the telephony devices, and is connected to telephony network 305 signaling and audio
15 channels. Call recording apparatus 300 contains interface element 310, interaction element 320, and recording element 330. Interface element 310 interfaces with telephony network 305 as needed to ensure proper connection of the calls, and connects calls to the internal audio bus 315. Interaction element 320 receives user commands, over the call audio path and other channels, to provide users with control
20 over the recording process. Recording element 330 records the telephone calls. Recording element 330 is capable of recording multiple calls simultaneously, recording being initiated and terminated for each call independently. Recording element 330 can be of any recording technology capable of recording a telephony signal.

25 Interface element 310 interfaces with telephony network equipment, such as network switches, so that an audio path is established to call recording apparatus 300 for all calls that are recorded. The connection is made without disrupting the link between the two parties to the call, and, in some cases, with only one of the parties to the call being aware that the call is being recorded.

30 The manner in which interface element 310 interacts with telephony network 305 depends on the type and capabilities of the network. Call recording apparatus 300 may be connected to a given call in one of two ways. These ways include:

1) Mid-path connection – the call is connected between the two parties via call recording apparatus 300. Interface element 310 receives incoming calls from telephony network 305, and connects the calls to their respective destinations. Methods by which network switch 307 routes a telephone call to the call recording apparatus 300 as part of the connection establishment process are described in greater detail below.

2) Third-party –call recording apparatus 300 is connected as a third party to a specified call. A conference is established between the two calling parties and call recording apparatus 300 for an existing call, via one of the switches participating in the call, (for example, using Signaling System 7 (SS7) protocols), or via the user's telephone.

Other ways of forming an audio-path connection to call recording apparatus may be possible, as determined by telephone network capabilities and configuration.

Reference is now made to Fig. 4, which is a simplified block diagram of an interface element according to a preferred embodiment of the present invention. Interface element 400 is responsible for interacting with the network, for forwarding incoming calls to their final destination, and/or for ensuring that the call recording apparatus is connected as a third-party to a specified (by the network or via a telephony device). Interface element 400 preferably contains signaling manager 410, audio manager 420, and conference manager 430. Signaling manager 410 communicates with the network, using relevant network protocols. Audio manager 410 handles the audio signals received from the network, connecting relevant calls to the call recording apparatus' internal audio bus. (A relevant call is any call with the potential for recording. Relevant calls include all calls selected for rule-based recording, and additionally all calls for which a legitimate recording trigger may be received from a user.) Conference manager 430 controls signaling manager 410 and audio manager 420, as needed to set up a conference to connect the call recording apparatus as a third party to a call. Alternate embodiments may not include all three elements. For example, conference manager 430 may not be necessary if third-party connection of the call recording apparatus is not supported.

In the preferred embodiment, interface element 400 contains signaling manager 410 which communicates with the network switches and other network

equipment. Signaling manager 410 sends and receives messages (such as ISUP or INAP messages) over the signaling channel, to ensure that relevant calls are routed by the network to the call recording apparatus, to receive notification of call characteristics from the network, and to receive notification of audio path signals detected by the telephony network. Examples of communication between signaling manager 410 and various types of telephony networks are described for Figs. 7-10 below.

In the preferred embodiment, interface element 400 contains audio manager 420, which handles incoming audio signals from the network. Audio manager 420 connects relevant calls to the internal audio bus. Audio manager 420 may also connect a received call to its destination, for mid-path connection of the call recording apparatus. Alternately, audio manager 420 may forward calls between the calling parties, by acting as an intermediate switch in the network.

In the preferred embodiment, interface element 400 contains conference manager 430 which interacts with the telephony network, so that the call recording apparatus may be connected as a third party to a specified call as a third party. In a first preferred embodiment, the call recording apparatus connects to an existing call at one of the network switches on the path of the call. In this case, conference manager 430 commands signaling manager 410 to use network protocols, such as the SS7 interface, to send messages to the network switch requesting that a conference call be set up. The network switch can then connect the call recording apparatus to the call's audio path. In a second preferred embodiment, the third-party connection is made at the user's telephony device. In this case, the user sends a mid-call trigger to begin recording a call after the call has been established at his telephony device. Conference manager 430 then commands audio manager 420 to make a separate call to the user. When the user receives the call from the call recording apparatus, the user can form the conference manually at his telephone.

The interaction element is responsible for determining which calls should be recorded, based on user-provided signals and information. The determination process is influenced by the way that the call recording apparatus is connected to the audio path of the call. Preferably, the determination is performed in one of two ways:

1) Rule-based – applicable for mid-path connection. Incoming calls are examined, and checked against a set of user-provided recording rules. Calls that fulfill a recording rule are recorded. Recording is performed automatically, without requiring further user input.

5 2) On-demand (trigger-based) – applicable for mid-path and third party connections. The user sends a trigger signal to call recording apparatus requesting that a specified call be recorded. The trigger signal can be sent over the audio path of the specified call (in-band), for example as a dual-tone multi-frequency (DTMF) sequence sent from the telephone keypad. Alternately, the trigger signal can be sent
10 out-of-band over a different (non-audio) channel, such as an IP connection. When a trigger signal is received for a call connected via the call recording apparatus, recording begins directly. When the specified call is an existing call, call recording apparatus first connects to the call audio path as a third party, and only then begins recording. The user can send a similar trigger signal to stop recording a call.

15 The trigger signal can arrive at the interaction element in a number of ways. The trigger may be sent over the call audio path, via a data connection, or over a telephony network signaling channel. Other triggering mechanisms may be possible. The interaction element preferably contains the necessary components and/or capabilities to detect the incoming trigger signals, including a DTMF detection
20 component, a data interface, and/or appropriate handling of network messages by the interface element, as described below. Triggers signals can be noisy (heard by both parties to the call) or silent (made by one party without the second party's knowledge). Out-of-band triggers are not sent over the audio path of the call, and are therefore silent. In-band triggers, such as DTMF signals sent from the telephone
25 keypad are commonly noisy, however, the DTMF sequence may be masked by the interface element, when the call audio signal is forwarded via the call recording apparatus.

Reference is now made to Fig. 5, which is a simplified block diagram of an interaction element, according to a preferred embodiment of the present invention.
30 Interaction element 500 communicates with user both on-line, for decision-making during the recording process, and off-line, for user registration and for user control of the recording process. Preferably interaction element 500 contains one or more of the

following: call filter 510, DTMF detection unit 520, data interface 530, IVR processor 540, database 550, triggerer 560, and user notifier 570.

In the preferred embodiment, interaction element 500 contains call filter 510, which performs rule-based selection to select which of the calls directed to the call recording apparatus by the telephony network should be recorded. As described
5 above, the interface element interacts with the network to have relevant calls directed to the call recording apparatus. Call filter 510 compares the characteristics of the incoming calls to the recording rules defined by the users, and selects the calls which should be recorded. The selection rules are generally provided by the user to
10 interaction element 500, as described below. Recording rules may be based on various characteristics of the call. Following are possibilities of pre-defined rules:

- 1) Recording incoming calls according to the caller number (ANI, CLI)
- 2) Recording outgoing calls according to the destination number (DNIS)
- 3) Recording all the incoming calls
- 15 4) Recording all the outgoing calls
- 5) Recording some of the calls - selective recording algorithms: random or fixed percentage (to be used mainly by businesses).

Preferably, interaction element 500 contains DTMF detection unit 520 for sensing DTMF sequences sent over a telephone connection. The user provides the
20 DTMF sequence by pressing a sequence of telephone keys. The user may enter specified sequences to:

- 1) Send in-band recording triggers
- 2) Identify himself to the system

Preferably, interaction element 500 contains data interface 530, which allows a
25 user to use a software application to provide commands to the call recording apparatus over a data network, such as the Internet. Users can thus control the call recording apparatus from a computer terminal. Users may use data interface 530 to:

- 1) Register to the system
- 2) Define recording rules
- 30 3) Send out-of-band recording triggers.
- 4) Play-back recordings using voice-streaming
- 5) Manage recordings

Software-based triggering is particularly relevant for recording calls from a call center, where a single software application can be used to request call recording for any of the call center lines. Commands can be sent from a computer, or by any device with Internet connection capabilities, such as a PDA or cellular phone.

5 Interaction element 500 preferably contains IVR processor 540. Users may use the IVR processor 540 to:

- 1) Play back recordings
- 2) Register to the system
- 3) User authentication before call recording or playback.
- 10 4) Hear recording approval prompts and approve recording.

In the preferred embodiment, interaction element 500 contains database 550, which contains a table of all registered users. Each registered user has a profile that includes all the details of the user. Database 550 preferably contains information that includes:

- 15 1) User selection rules
- 2) User authentication information
- 3) A lookup table between authenticated users and the respective numbers to be recorded (for correlating a user trigger signal to the appropriate call).

Database 550 provides information to various call recording apparatus
20 components. For example, when a routing request arrives to the call recording apparatus (for example, IN, ISUP or HLR based), a query is executed by call filter 510 (which received the call parameters from the signaling manager) against the subscriber table. If one of the parties (initiator or terminator) is a subscriber of the service, the interface element ensures that the call is re-routed through the call
25 recording apparatus.

In the preferred embodiment, interaction element 500 contains triggerer 560 which sends recording event signals to the recording element to control the recording process. Triggerer 560 signals the recording element to start and/or stop recording a particular channel of the internal audio bus. For trigger-based recording, triggerer 560
30 generates the recording events based on information provided by data interface 530, DTMF detection unit 520, and/or any other interaction element components involved

in detecting user-provided trigger signals. For rule-based recording, triggerer 560 generates the recording events based on information provided by call filter 910.

Preferably, interaction element 500 authenticates the user's identity and entitlement to requested services whenever instructions are received from the user, and before initiating recording. Identification may be performed by having the user enter an identifying DTMF sequence. Identifying the user is particularly important when the user is not automatically identified by the telephony network. For example, a telephone user might hide his number when making calls. In this case, when a recording trigger is submitted for an outgoing call, call filter 510 cannot tell who is the subscriber. User identity may also not be known when the subscriber receives a call and is a member of a shared line group or behind an Automatic Call Distributor. Interaction element 500 may determine user entitlement from a lookup table of authenticated users and their privileges stored in database 550.

In the preferred embodiment, interaction element 500 contains user notifier 570, which notifies the subscriber that a recording has been made, and the details of the recording. The user may be notified of the recording by email, by a message on the user's Voice Mail system, or by a cellular telephone messaging service such as SMS. User notifier 570 may also notify the user when recording begins. If needed, approval to record the call can be collected from the other party using an IVR script.

Reference is now made to Fig. 6, which is a simplified block diagram of a recording element, according to a preferred embodiment of the present invention. In the preferred embodiment, recording element 600 contains channel manager 610, command processor 620, and temporary storage 630. Channel manager 610 connects to the internal audio bus, and records specified channels. Channel manager 610 is controlled by command processor 620, which receives recording event signals from the interface element. Command processor 620 signals channel manager 610 to start and stop recording a particular audio channel. While recording, channel manager 610 stores the recordings in temporary storage 630. Preferably, the recordings are transferred from temporary storage into a storage element (see below) when the call is disconnected. Preferably, the recording can be played back to the user from temporary storage 630. The user can stay on the line after the call has ended, and request that the call be played back immediately via an IVR menu. Immediate

playback may be provided for calls which are connected via the recording apparatus, for which the call recording apparatus functions as an intermediate switch. When the second party disconnects at the end of the call, the user's call is connected to an IVR port which maintains the connection to the user.

5 In the preferred embodiment, recording element 600 provides a digital recording for storage in a hard disk, or other digital storage device such as a CD.

Preferably, recording element 600 attaches an identifier to each recording, so that a user can access the recording at a later time. The identifier may be numerical, or may be a voice label recorded by the subscriber. The identifier may include call
10 details, such as the telephone numbers of the parties to the call, or the time of day and duration of the call.

Figs. 7-10 illustrate examples of call connection to the call recording apparatus, for several types of telephony networks. Note that the figures do not show intermediate switches along the call connection path.

15 Fig. 7 shows on-demand recording by call recording apparatus 710 connected to an intelligent network (IN) 720. An IN is a telephony network architecture originated by Bell Communications Research (Bellcore) in which the service logic for a call is located separately from the switching facilities, allowing services to be added or changed without having to redesign switching equipment. A switch that is
20 configured for mid-call IN triggers, monitors the audio connections of existing calls, and detects DTMF sequences pressed by callers. When the special sequence used as a recording trigger is detected, the monitoring switch sends a mid-call event to the call recording apparatus using IN protocols (INAP). The call recording apparatus then sends a request to one of the relevant switches to set up a conference between the two
25 talking parties of the call and the recording unit. Call recording apparatus is involved in the recording process only when the user has requested that a call be recorded by pressing a special DTMF sequence. The recording process takes place as follows:

- 1) The calling party places the call from his telephone 730.
- 2) The call is received at the local network switch 740.
- 30 3) Network switch 740 continues the connection to network switch 750.
- 4) The call is connected to the second party.

5) The local switch detects that the user has pressed a special DTMF sequence, and sends a Mid-call event to Call recording apparatus 710, using IN protocols (INAP).

6) Call recording apparatus 710 requests a conference call, using SS7 protocols.

7) Network switch 740 establishes a conference call, adding Call recording apparatus 710 to the audio path of the existing call.

The advantage of the above scenario is that it requires minimal involvement of Call recording apparatus 710. Call recording apparatus 710 interacts with the telephony network only for calls which should be recorded.

Fig. 8 shows a more general scenario for recording calls connected using intelligent network capabilities. In the current scenario, both trigger-based and rule-based recording can be provided. Call recording apparatus 810 uses IN protocols to participate in the routing process (acting like a Service Control Point), to ensure that calls which it may be required to record are connected via the call recording apparatus 810. Whenever a call is placed, local switch 840 sends a Transaction Capabilities Application Part (TCAP) request to call recording apparatus 810. Call recording apparatus 810 examines the characteristics of the call, and instructs local switch 840 to route relevant calls to the call recording apparatus 810, and to route other calls directly to network switch 850. The recording process takes place as follows:

1) The calling party places the call from his telephone 830.

2) The call is received at the local network switch 840.

3) Local switch 840 sends a TCAP query request to call recording apparatus 810.

4) Call recording apparatus 810 determines from the database that one of the parties to the call is a subscribing user, and responds to the TCAP request to instruct switch 840 to route the call via the Call recording apparatus 810.

5) The call is connected to call recording apparatus 810.

6) Call recording apparatus 810 functions like an intermediate (tandem) switch and forwards the call to network switch 850.

7) The call is connected to the second party. Once the call is connected, call recording apparatus 810 may record the entire call, or await a recording trigger from the user.

Fig. 9 shows the recording process for Call recording apparatus 910 connected to telephony network 920. Call recording apparatus 910 uses ISDN User Part (ISUP) protocols to participate in the routing process, to ensure that calls which it may be required to record are connected via the call recording apparatus 910. Whenever a call is placed in telephony network 920, local switch 940 sends an Initial Address Message (IAM) to call recording apparatus. For relevant calls, call recording apparatus 910 functions like an intermediate switch. For other calls, an error message is returned to the local switch (for example, a no more telephony ports available message) and an alternative routing path is selected (not through call recording apparatus 910). The recording process takes place as follows:

- 1) The calling party places the call from his telephone 930.
- 2) The call is received at the local network switch 940.
- 3) Network 920 sends an IAM to call recording apparatus 910.
- 4) Call recording apparatus 910 determines from the database that one of the parties to the call is a subscribing user, and continues the connection establishment process to the next switch, local network switch 950. Once the call is established the voice path is opened through the recording apparatus, in the manner of an intermediate switch.

Once the call is connected, Call recording apparatus 910 may record the entire call, or await a recording trigger from the user.

Fig. 10 shows the recording process for Call recording apparatus 1010 connected to cellular network 1020. In the current scenario, Call recording apparatus 1010 is configured as a Home Location Register (HLR). The HLR is the main database of permanent subscriber information for a mobile network. Cellular networks query the HLR to determine the route of the call. The call recording apparatus is configured as an HLR. When routing a call, the network switch queries the call recording apparatus to determine where the call should be directed. The call recording apparatus directs the switch to forward relevant calls to the call recording

apparatus. The calls are then forwarded to their destination by the call recorder, using the original HLR entry. The recording process takes place as follows:

- 1) The calling party places the call from his telephone 1030.
- 2) The call is received at the local network switch 1040.
- 5 3) Network 1020 sends an HLR query to Call recording apparatus 1010.
- 4) Call recording apparatus 1010 determines from the database that one of the parties to the call is a subscribing user, and instructs the network to route the call via the Call recording apparatus 1010.
- 5) The call is connected to call recording apparatus 1010.
- 10 6) Call recording apparatus 1010 queries HLR 1060 to determine the original HLR entry, and forwards the call.
- 7) The call is received at local network switch 1070.
- 8) The call is connected to the second party.

Once the call is connected, Call recording apparatus 1010 may record the entire call,
15 or await a recording trigger from the user.

In the preferred embodiment, call recording apparatus is located at a single site, and provides centralized recording of all network traffic. In an alternate preferred embodiment, call recording apparatus is located at several sites, where each call recording apparatus site logs a portion of telephony network traffic. For example,
20 a separate call recording apparatus may be located at each local switch, to record local telephony traffic. Alternatively, call recording apparatus may be integrated with an existing voicemail infrastructure.

In the preferred embodiment, call recording apparatus is an independent apparatus, located outside telephony network, and connected to it by the necessary
25 telephony and data channels. In another preferred embodiment, call recording apparatus is part of a system including both telephony network and call recording apparatus. When the call recording apparatus forms a system with the telephony network, interfacing element may function as part of the network switching system. Call recording apparatus may be located on a dedicated server within the system, or
30 on one or more servers within the telephony network.

Once a call is recorded, the recording can be provided to the user in several ways. Reference is now made to Fig. 11, which is a simplified block diagram of a call

recording apparatus, according to a preferred embodiment of the present invention. The recording can be played back immediately from temporary storage, and/or be transferred into long-term storage for later playback. Additionally, the recording can be transferred to a physical medium, such as a compact disk (CD). Call recording apparatus 1100 contains interface element 1110, interaction element 1120, recording
5 element 1130, and any or all of storer 1140, library 1145, play-back unit 1150, accessor 1170, and transferrer 1180.

In the preferred embodiment, the call recording apparatus contains storer 1140 which stores recordings in a storage device. In the preferred embodiment, storer 1140
10 transfers recordings from temporary storage in the recording element to the storage device, after the recording process is completed.

Preferably, the storage device is library 1145, which is hosted on call recording apparatus 1100 itself. In another preferred embodiment the recording is stored on the network Voice Mail (or Unified Messaging) system. The user plays back
15 the call just like any other Voice Mail call. Recordings can be stored on the Voice Mail system by having storer 1140 deliver the recording to the Voice Mail system the end of the call in one of the following ways. Storer 1140 may simulate call-no-answer telephony signals to the user phone, in which case the Voice Mail records the call over the telephony network just like regular Voice Mail call. Another method is
20 to integrate call recording apparatus 1100 and the Voice Mail system, and in which case storer 1140 delivers the voice recording over the IP layer. The recording may also be stored on an external device installed on the customer premises (for personal and security reasons). At the end of the call storer 1140 delivers the recording over the IP network to the external device. The recording is played back from an external
25 personal device.

Play-back unit 1150 plays a recording back to the user immediately after the call is ended. Preferably, play-back unit 1150 plays back the recording from temporary storage in the recording element and/or long term storage in library 1145. An IVR menu may allow the user to play back the call immediately, discard the
30 recording, or attach a voice label to the recording. For play-back from temporary storage, the user stays on-hook after ending a call and plays back the recording immediately. For play-back from library 1145, play-back unit 1150 preferably allows

the user to call a special playback number and get into an IVR menu that identifies the user and retrieves the requested media from a storage device. Preferably, play-back unit 1150 allows the user to use an online application to query call recording apparatus 1100, and to play back calls using IP voice streaming techniques.

5 In the preferred embodiment, recording handler 1145 contains accessor 1170, which accesses recordings from a storage device or from temporary storage on the recording element, on user demand, preferably locating a recording using the call identifier. Accessor 1170 is particularly useful when the recording is stored in a library 1145 within call recording apparatus 1100.

10 In the preferred embodiment, recording apparatus 1100 contains transferrer 1180, which transfers recordings to a physical medium, such as a tape, diskette, or CD. The recording may be stored in digital form, as a computer file, and emailed to the user. Transferrer 1180 may receive the recording from recording element 1130 directly, or from accessor 1170.

15 Reference is now made to Fig. 12, which shows an example of a high-level layout of the interfaces required for operation of a call recording apparatus. The layout provides the necessary interfaces for implementing the abovedescribed embodiments. Call recording apparatus 1200 requires the following major interfaces:

20 1) Audio telephony interface (for connecting to the audio channel of network switches 1210.1 to 1210.n)

 2) Signaling telephony interface (for connecting to the signaling channel of network switches 1210.1 to 1210.n)

 3) IP interface (for connecting to user computer 1220 over the Internet)

25 Call recording apparatus 1200 may also connect to Voice mail system 1230 over the telephony and IP interfaces.

 The three interfaces enable the call recording apparatus to perform all the necessary functions. The call recording apparatus is able to connect to the voice path of calls, by conferencing or by a mid-path connection. The call recording apparatus is able to receive trigger signals, sent over the telephony network or the data network,
30 and to store the recordings in the Voice Mail system (or any other storage library).

 In addition to the basic call recording apparatus functions described above, the call recording apparatus platform design should address the following requirements:

1) Rerouting calls that should be recorded without interfering with other network services.

2) Providing recording and archiving facilities.

3) Providing users with a convenient way to register to the service.

5 4) Providing users with a convenient way to submit recording triggers and to playback the recorded calls.

5) Maintaining a secured platform to avoid fraud usage (e.g. preventing unauthorized playbacks).

6) Robust platform architecture without any single point of failure.

10 7) Providing administration, monitoring and operational tools for the on-site operations team.

8) Providing billing system adapters.

9) Providing statistics tools for service usage.

Reference is now made to Fig. 13, which is a simplified flowchart of a method
15 for selectively recording calls connected over a telephony network, according to a preferred embodiment of the present invention. The method enables recording calls from connected over a network, without any special equipment at the user premises. The network may be of any type, such as PSTN or cellular. In step 1310 an audio connection is ensured between relevant calls, that is calls which there may be a need
20 to record, and a recording element that can perform the recording. Preferably, the relevance of calls is decided by user request or by examining call-related parameters of each call, for example, recording all calls originating from a specified number. In step 1320, the relevant calls are received. In step 1330, the connected calls are examined, and calls are selected for recording. The selection may be made
25 automatically, in accordance with general or user-specified selection rules, and/or made on a per-call basis, in accordance with information supplied by a user during a call. The call is recorded in step 1340.

In the preferred embodiment, the method consists of the further step of receiving a trigger signal from a user to start recording a particular call. A different
30 trigger may be received from the user to stop recording a call.

The method preferably contains the further step of establishing the set of rules to perform the call selection process. The rules may be modifiable by the user.

User input, may be received in a number of ways, including from the user's telephony device, from an external telephony device uninvolved with the recorded call, or over an IP connection.

Preferably, the method includes the further step of authenticating the user
5 whenever instructions are received from the user. The authentication may include verifying the user's entitlement to the requested service. For example, a user may be entitled to request recording only for calls connected to certain numbers.

Ensuring the audio channel connection (step 1310) may involve several steps, either alone or in combination. The method may require inputting calls received from
10 the network, switching/routing received calls to the recording element, forwarding calls to their destination, and/or linking incoming and outgoing calls. Additionally, ensuring the connection may require instructing the telephony network how relevant calls should be switched, so that a connection to the relevant calls can be established. For example, it may be necessary for the network to direct certain calls to a particular
15 node. Ensuring a connection may also require establishing a conference call, so as to add the recording element as a third party to a specified call.

The method may include a number of steps for managing the call recording after the call is recorded (step 1330). Preferably, a numerical or voice identifier is attached to the call, to assist a user when accessing the recording. In the preferred
20 embodiment, the call may be played back immediately over the audio channel, or stored for later access by the user. Additionally, the recording may be transferred to a physical medium, such as a CD or diskette.

In the preferred embodiment, the method includes the further step of sending a message informing the user that a recording has been made.

25 Reference is now made to Fig. 14, which is a simplified flowchart of a method for recording a telephone call, according to a preferred embodiment of the present invention. In the current method a call is selected according to predefined selection rules. Call recording may be initiated automatically, or upon receipt of a user trigger.

In step 1405 call recording rules are defined. In step 1410 an audio
30 connection is ensured between relevant calls, that is calls which there may be a need to record, and a recording element that can perform the recording. In step 1420, the relevant calls are received. In step 1430, the connected calls are examined, and calls

that conform to a recording rule (as defined in step 1405) are recorded automatically in step 1440. Calls which do not conform to a recording rule are not recorded, unless a trigger signal is received in step 1435. If no trigger signal is received, the call is not recorded. In step 1450, the recording is played back to the user, immediately after the connection to the second party is ended.

The abovedescribed embodiments form a model which can be used for providing other network-based services to users, based on an analysis of call parameters and/or mid-call commands. The network-based services may enable users to eliminate on-site equipment. One example is a network-based call-filtering service. A user can define rules that allow only certain numbers to connect to the user's line. The call filtering service analyzes calls directed to the user's number, and redirects the calls according to the user-defined rules.

Reference is now made to Fig. 15, which is simplified block diagram of a remote call servicing system, according to a preferred embodiment of the present invention. Remote call servicing system 1500 contains call servicing apparatus 1505 and telephony network 1510. Call servicing apparatus 1505 is connected to relevant calls, which are connected over telephony network 1510. The network may be of any type, such as PSTN or cellular. Remote call servicer 1500 connects to telephony network 1510, and can provide services to calls connected over telephony network 1510, between all subscribers, 1520.1 to 1520.n. Like the call recording apparatus, call servicer 1500 is capable of simultaneously servicing multiple calls.

Reference is now made to Fig. 16, which is a simplified block diagram of a call servicing apparatus, according to a preferred embodiment of the present invention. Call servicing apparatus 1600 contains interface element 1610, call processor 1630, call filter 1640, and triggerer 1650. Interface element 1610 interfaces with the telephony network as needed to ensure proper connection of the calls, and connects calls to the internal audio bus 1615. Interface element 1610 functions similarly to the interface element of the call recording apparatus (310 of Fig. 3), with the difference that interface element 1610 may establish a connection with the data channel of the call as well as the audio channel. Call processor 1630 processes the selected calls as needed to provide the required service. Interaction element 1620 receives user commands, over the call audio path and other channels, to provide users

with control over call servicing. Call filter 1640 performs rule-based selection to select which of the connected calls should be serviced, and provides the information to triggerer 1650 which controls call processor 1630. The selection rules are generally provided by the user. Call filter 1640 functions similarly to the call filter of the call recording apparatus (510 of Fig. 5). Triggerer 1650 controls call processor 1630, in accordance with the selections made by call filter 1640. Call filter 1640 and triggerer 1650 are shown as independent components for clarity, but may be integrated into interaction element 1620, as in the call recording apparatus.

In the preferred embodiment, call processor 1630 is able to independently service multiple concurrent calls.

Preferably, call processor 1630 is capable of providing more than one service, where the particular service or services for a particular call may be determined automatically according to a rule-based determination procedure or on an ad-hoc basis in accordance with user input.

In another preferred embodiment, interaction element 1620 contains specifier 1625. Specifier 1625 detects trigger signals sent by users (as discussed above), requesting that service be provided to specified calls. Triggerer 1650 controls call processor 1630 in accordance with information provided by specifier 1625, so that the service is provided to the user-specified calls.

Preferably, call servicing apparatus 1600 provides both rule-based and trigger-based selection of calls for servicing.

Reference is now made to Fig. 17, which is a simplified flowchart of a method for selectively providing a service to calls connected over a telephony network, according to a preferred embodiment of the present invention. The method provides telephony network users with a desired service from a network site, without any special equipment at the client facility. In step 1710 an audio and/or data connection is ensured between relevant calls (that is, calls which there may be a need to service) and a processing element that can service calls. Preferably, the relevance of a call is decided by comparing call-related parameters to specified rules or by trigger signals received from the user. Relevant calls are received in step 1720. In step 1730, the connected calls are examined, and, if call characteristics are consistent with those required for service provision, the call is selected. The selection may be made

automatically, in accordance with general or user-specified selection rules, and/or made on a per-call basis, in accordance with information supplied by a user either prior or during a call. The service is provided in step 1740.

The above described embodiments provide a simple method for recording
5 telephone calls over a telephony network, which can be of great benefit to users. Network-based recording removes the need for network users to acquire and maintain the equipment required for on-site recording. Network-based recording (and other services) can provide telephony networks with a significant advantage in attracting users, and assist network operators in expanding the network subscriber base,

10 It is expected that during the life of this patent many relevant telephony networks, network switches, network routers, recording devices, and user interfaces will be developed and the scope of the term telephony network, network switch, network router, recording device, and user interface is intended to include all such new technologies *a priori*.

15 As used herein the term "about" refers to $\pm 10\%$.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be
20 provided separately or in any suitable subcombination.

Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad
25 scope of the appended claims. All publications, patents and patent applications mentioned in this specification are herein incorporated in their entirety by reference into the specification, to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated herein by reference. In addition, citation or identification of any reference in this
30 application shall not be construed as an admission that such reference is available as prior art to the present invention.

WHAT IS CLAIMED IS:

1. A call recording apparatus remotely located over a network for recording of telephone calls, comprising:

an interface element for interfacing said call recording apparatus to an external telephone network supporting a plurality of independent subscribers;

an interaction element for receiving commands regarding any one of a plurality of terminal devices associated with said subscribers regarding call recording; and

a recording element associated with said interaction element and said interface element, for recording telephone calls involving a respective one of said plurality of subscribers in accordance with said received commands.

2. A call recording apparatus according to claim 1, wherein said interface element comprises an audio manager operable to handle audio telephony signals.

3. A call recording apparatus according to claim 2, wherein said audio manager is operable to route a call received from said network via said call recording apparatus to a respective destination terminal device.

4. A call recording apparatus according to claim 2, wherein said audio manager is operable to forward a call to a specified network switch.

5. A call recording apparatus according to claim 2, wherein said audio manager is operable to connect a specified call to an internal audio bus of said call recording apparatus.

6. A call recording apparatus according to claim 2, wherein said audio manager is operable to make an outgoing call to a specified destination terminal device.

7. A call recording apparatus according to claim 6, wherein said audio manager is operable to connect a call received from said network to said outgoing call.

8. A call recording apparatus according to claim 1, wherein said interface element comprises a conference manager operable to ensure connection of the call recording apparatus as a third party to a specified call.
9. A call recording apparatus according to claim 8, wherein said conference manager is operable to instruct a network switch to add said call recording apparatus as a third party to said specified call.
10. A call recording apparatus according to claim 8, wherein, upon receipt of a mid-call recording trigger, said conference manager is operable to call a terminal device associated with said trigger.
11. A call recording apparatus according to claim 1, wherein said interface element comprises a signaling manager, for communicating with said network over a signaling channel.
12. A call recording apparatus according to claim 11, wherein said signaling manager is operable to instruct said network to direct specified telephone calls to said call recording apparatus.
13. A call recording apparatus according to claim 11, wherein said signaling manager is operable to receive mid-call events from a switch with intelligent telephony network (IN) capabilities.
14. A call recording apparatus according to claim 11, wherein said communicating conforms to a Signaling System 7 (SS7) protocol.
15. A call recording apparatus according to claim 14, wherein said communicating conforms to an ISDN User Part (ISUP) protocol.
16. A call recording apparatus according to claim 11, wherein said signaling manager is operable to query a cellular network Home Location Register (HLR).

17. A call recording apparatus according to claim 11, wherein said signaling manager comprises a proxy HLR.

18. A call recording apparatus according to claim 1, wherein said network comprises a cellular telephony network.

19. A call recording apparatus according to claim 1, wherein said network comprises a public switched telephone network (PSTN).

20. A call recording apparatus according to claim 1, wherein said network comprises a telephony network operable to provide selectively available telephony services.

21. A call recording apparatus according to claim 20, wherein said network supports an intelligent network (IN).

22. A call recording apparatus according to claim 20, wherein said network supports an advanced intelligent network (AIN).

23. A call recording apparatus according to claim 1, wherein said interaction element comprises a call filter for performing rule-based selection of calls for recording.

24. A call recording apparatus according to claim 23, wherein said selecting is performed in accordance with a state of at least one call-related parameter.

25. A call recording apparatus according to claim 24, wherein said call-related parameter comprises a respective originating terminal device.

26. A call recording apparatus according to claim 24, wherein said call-related parameter comprises a respective destination terminal device.

27. A call recording apparatus according to claim 24, wherein said call filter is operable to determine said call-related parameter from an ISUP-based message associated with said call.

28. A call recording apparatus according to claim 27, wherein said ISUP-based message comprises an Initial Address Message (IAM).

29. A call recording apparatus according to claim 24, wherein said call filter is operable to determine said call-related parameter from an HLR query associated with said call.

30. A call recording apparatus according to claim 24, wherein said call filter is operable to determine said call-related parameter from information received from a telephony network operable to provide selectively available telephony services.

31. A call recording apparatus according to claim 1, wherein said interaction element is operable to detect a recording trigger received from one of said subscribers

32. A call recording apparatus according to claim 31, wherein said recording trigger comprises a mid-call trigger.

33. A call recording apparatus according to claim 1, wherein said interaction element comprises a triggerer for sending a recording event associated with a specified audio channel to said recording element.

34. A call recording apparatus according to claim 23, wherein said interaction element further comprises a triggerer for sending to said recording element a recording event associated with an audio channel specified by said call filter.

35. A call recording apparatus according to claim 31, wherein said interaction element further comprises a triggerer for sending to said recording element a recording event for an audio channel associated with said recording trigger.

36. A call recording apparatus according to claim 33, wherein said recording event is for instructing said recording element to start recording said specified audio channel.

37. A call recording apparatus according to claim 33, wherein said recording event is for instructing said recording element to stop recording said specified audio channel.

38. A call recording apparatus according to claim 1, wherein said interaction element comprises a database for holding user profiles.

39. A call recording apparatus according to claim 1, wherein a user profile comprises recording rules associated with said user.

40. A call recording apparatus according to claim 1, wherein a user profile comprises user authentication information.

41. A call recording apparatus according to claim 1, wherein said interaction element comprises an Interactive Voice Response (IVR) system.

42. A call recording apparatus according to claim 1, wherein said interaction element is operable to identify a user, and to verify said user's authority to request a service.

43. A call recording apparatus according to claim 1, wherein said interaction element is operable to receive signals over the audio channel of a connected call.

44. A call recording apparatus according to claim 1, wherein said interaction element comprises a dual-tone multi-frequency (DTMF) sequence detection unit.

45. A call recording apparatus according to claim 1, wherein said interaction element comprises a data interface for communicating with a data network.

46. A call recording apparatus according to claim 1, further comprising an internal library for storing call recordings.
47. A call recording apparatus according to claim 46, further comprising a storer for transferring a recording from said recording element to a storage element.
48. A call recording apparatus according to claim 47, wherein said storage element comprises an external storage device.
49. A call recording apparatus according to claim 47, wherein said storage element comprises an internal library.
50. A call recording apparatus according to claim 47, wherein said storage element is incorporated within a Voice Mail system.
51. A call recording apparatus according to claim 1, further comprising an accessor for accessing stored recordings from a storage element.
52. A call recording apparatus according to claim 51, wherein said accessor is operable to access a recording from temporary storage in said recording element.
53. A call recording apparatus according to claim 51, wherein said accessor is operable to access said recording from said internal library.
54. A call recording apparatus according to claim 51, wherein said accessor is operable to provide an accessed recording to a play-back unit.
55. A call recording apparatus according to claim 51, wherein said accessor is operable to locate a stored recording in accordance with an identifier associated with said stored recording.
56. A call recording apparatus according to claim 1, wherein said interaction element comprises a play-back unit for playing back a recording.

57. A call recording apparatus according to claim 56, wherein said play-back unit is operable to play back a recording over a telephony audio channel.

58. A call recording apparatus according to claim 56, wherein said play-back unit is operable to play back a recording by voice-streaming over a data channel.

59. A call recording apparatus according to claim 1, wherein said interaction element comprises a transferrer for transferring a recording to a physical medium.

60. A call recording apparatus according to claim 1, wherein said interaction element comprises a user notifier for sending a message containing information of a recorded call to a subscriber.

61. A call recording apparatus according to claim 1, wherein said recording element comprises:

a command processor, for receiving recording events from said interaction element;

a channel manager, for recording specified channels of an internal audio bus;
and

a temporary storage element, for providing temporary storage of a recorded channel.

62. A call recording apparatus according to claim 1, wherein said recording element is operable to associate an identifier with a call recording.

63. A call recording apparatus according to claim 62, wherein said identifier comprises a numerical identifier.

64. A call recording apparatus according to claim 62, wherein said identifier comprises a voice identifier.

65. A call recording apparatus according to claim 1, wherein said call recording apparatus is located in a single site, for centralized recording of network telephony traffic.

66. A call recording apparatus according to claim 1, wherein said call recording apparatus is located in multiple locations, each of said locations being operable to record a local portion of network telephony traffic.

67. A call recording apparatus according to claim 1, wherein said call recording apparatus is hosted on a Voice Mail infrastructure.

68. A system for recording telephone calls over a telephony network, comprising:

a telephony network, for connecting telephone calls of a plurality of independent subscribers;

a call recording apparatus associated with said telephony network, comprising:

an interface element for interfacing said call recording apparatus to said telephone network;

an interaction element for receiving commands regarding any one of a plurality of terminal devices associated with said subscribers regarding call recording; and

a recording element associated with said interaction element and said interface element, for recording telephone calls involving a respective one of said plurality of subscribers in accordance with said received commands.

69. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interface element comprises an audio manager operable to handle audio telephony signals.

70. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said audio manager is operable to route a call via said call recording apparatus to a respective destination terminal device.

71. A system for recording selected telephone calls over a telephony network according to claim 69, wherein said audio manager is operable to connect a specified call to an internal audio bus.

72. A system for recording selected telephone calls over a telephony network according to claim 69, wherein said audio manager is operable to make an outgoing call from said call recorder to a respective destination subscriber of a received call, and link said received and outgoing calls.

73. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interface element comprises a conference manager operable to ensure connection of said call recording apparatus as a third party to a specified call.

74. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interface element comprises a signaling manager for communicating with said network over a signaling channel.

75. A system for recording selected telephone calls over a telephony network according to claim 74, wherein said signaling manager is operable to instruct said network to direct specified calls to said call recording apparatus.

76. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said network comprises a cellular telephony network.

77. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said network comprises a public switched telephone network (PSTN).

78. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said network comprises a telephony network operable to provide selectively available telephony services.

79. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element comprises a call filter for performing rule-based selection of calls for recording.

80. A system for recording selected telephone calls over a telephony network according to claim 79, wherein said selecting is performed in accordance with a state of at least one call-related parameter.

81. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element is operable to detect a recording trigger received from one of said subscribers

82. A system for recording selected telephone calls over a telephony network according to claim 81, wherein said recording trigger comprises a mid-call trigger.

83. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element comprises a triggerer for sending a recording event associated with a specified audio channel to said recording element.

84. A system for recording selected telephone calls over a telephony network according to claim 83, wherein said recording event is for instructing said recording element to start recording said specified audio channel.

85. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element comprises a database for holding user profiles.

86. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said recording element is operable to associate an identifier with a call recording.

87. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element comprises an IVR system.

88. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element is operable to identify a user and to verify said user's authority to request a service.

89. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element comprises a DTMF sequence detection unit.

90. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said interaction element comprises a data interface for communicating with a data network.

91. A system for recording selected telephone calls over a telephony network according to claim 68, further comprising an internal library for storing call recordings.

92. A system for recording selected telephone calls over a telephony network according to claim 68, further comprising a storer for storing a recording within a storage device.

93. A system for recording selected telephone calls over a telephony network according to claim 68, further comprising an accessor for accessing recordings from a storage device.

94. A system for recording selected telephone calls over a telephony network according to claim 91, further comprising a play-back unit for playing back a recorded copy of a call.

95. A system for recording selected telephone calls over a telephony network according to claim 91, further comprising a transferrer for transferring a recording to a physical medium.

96. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said recording element comprises:

a command processor, for receiving recording events from said interaction element;

a channel manager, for recording specified channels of an internal audio bus;
and
a temporary storage element, for providing temporary storage of a recorded channel.

97. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said call recording apparatus is located in a single site, for centralized recording of network telephony traffic.

98. A system for recording selected telephone calls over a telephony network according to claim 68, wherein said call recording apparatus is located in multiple locations, each of said locations being operable to record a portion of network telephony traffic.

99. A system for remotely providing a service to selected telephone calls connected over a telephony network, comprising:
a telephony network; and
a call servicing apparatus associated with said telephony network, comprising:
a call processor, for servicing a call;
an interface element associated with said call processor, for ensuring a connection of specified calls to said call processor;
a call filter associated with said interface element, for selecting from said specified calls; and
a triggerer associated with said call filter and said call processor, for controlling said call processor to service said selected calls.

100. A system for remotely providing a service to selected telephone calls according to claim 99, wherein said interface element is operable to route a call via said call servicing apparatus to a respective destination terminal device.

101. A system for remotely providing a service to selected telephone calls according to claim 99, wherein said interface manager is operable to make an outgoing call to a respective destination subscriber of a connected call, and to link said connected and said outgoing calls.

102. A system for remotely providing a service to selected telephone calls according to claim 99, wherein said interface manager is operable to ensure the connection of said call servicing apparatus as a third party to a specified call.

103. A system for remotely providing a service to selected telephone calls according to claim 99, wherein said interface manager is operable to instruct a network to direct said specified calls to said call servicer.

104. A system for remotely providing a service to selected telephone calls according to claim 99, wherein said call filter is operable to perform rule-based selection, in accordance with a state of at least one call-related parameter.

105. A system for remotely providing a service to selected telephone calls according to claim 104, wherein said call filter performs said selecting in accordance with a state of at least one call-related parameter.

106. A system for remotely providing a service to selected telephone calls according to claim 99, further comprising an interaction element for receiving commands from subscribers regarding service provision.

107. A system for remotely providing a service to specified telephone calls connected over a telephony network, comprising:

- a telephony network; and

- a call servicing apparatus associated with said telephony network, comprising:

- a call processor, for servicing a call;

- an interface element associated with said call processor, for ensuring a connection of specified calls to said call processor;

- a specifier associated with said interface manager, for specifying a call in response to a command received from a respective subscriber; and

- a triggerer associated with said specifier and said call processor, for controlling said call processor to service said specified calls.

108. A system for remotely providing a service to specified telephone calls according to claim 107, wherein said command is received during said respective call.

109. A system for remotely providing a service to specified telephone calls according to claim 107, wherein said interface manager is operable to ensure connection of said call servicing apparatus as a third party to a specified call.

110. A system for remotely providing a service to specified telephone calls according to claim 107, wherein said interface manager is operable to route a call via said call servicing apparatus to a respective destination terminal device.

111. A system for remotely providing a service to specified telephone calls according to claim 107, comprising an interaction element for receiving commands from subscribers regarding service provision.

112. A method for remotely recording selected telephone calls connected over a telephony network, comprising:

- ensuring an audio-channel connection of specified calls connected over said network to a recording element;
- receiving the audio channel of said specified calls;
- selecting calls for recording; and
- recording said selected calls.

113. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said ensuring comprises receiving incoming calls from said network.

114. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said ensuring comprises forwarding a received call to a respective destination subscriber.

115. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said ensuring comprises making

an outgoing call to a respective destination subscriber of a received call, and linking said received and said outgoing calls.

116. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said ensuring comprises connecting to a call as a third party.

117. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said ensuring comprises instructing said network to perform said connecting.

118. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said selecting is rule-based, in accordance with a state of at least one call-related parameter.

119. A method for remotely recording selected telephone calls connected over a telephony network according to claim 118, further comprising establishing a set of rules for performing said selecting.

120. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising starting said recording upon receipt of a first trigger signal.

121. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising ending said recording upon receipt of a second trigger signal.

122. A method for remotely recording selected telephone calls connected over a telephony network according to claim 120, wherein said first trigger signal is received prior to said call.

123. A method for remotely recording selected telephone calls connected over a telephony network according to claim 120, wherein said first trigger signal is received during said call.

124. A method for remotely recording selected telephone calls connected over a telephony network according to claim 120, wherein said first trigger signal comprises one of a group of signals comprising: a signal transmitted over the voice channel of a connected call, a DTMF signal, and a data signal.

125. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said specified calls comprise calls originating from a specified telephony subscriber.

126. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said specified calls comprise calls destined for a specified telephony subscriber.

127. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, wherein said specified calls comprise calls identified by a subscriber.

128. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising forwarding a call to a destination subscriber.

129. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising associating an identifier with a recorded copy of a call.

130. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising playing back a recorded copy of a call.

131. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising storing a recorded copy of a call within an internal library.

132. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising storing a recorded copy of a call in a Voice Mail system.

133. A method for remotely recording selected telephone calls connected over a telephony network according to claim 131, further comprising accessing a recorded copy of a call from said internal library.

134. A method for remotely recording selected telephone calls connected over a telephony network according to claim 131, further comprising locating a recorded copy of a call within said internal library by an identifier associated with said copy.

135. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising transferring a recorded copy of a call to a physical medium.

136. A method for remotely recording selected telephone calls connected over a telephony network according to claim 112, further comprising sending a message containing information of a recorded call to a specified subscriber.

137. A method for remotely providing a service to selected telephone calls connected over a telephony network, comprising:

ensuring a connection of specified calls connected over said network to a call processing element;

receiving said specified calls;

selecting calls for service provision; and

providing said service to said selected calls.

138. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises receiving the voice channel of said specified calls.

139. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises receiving the data channel of said specified calls.

140. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises receiving incoming calls from said network.

141. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises forwarding a received call to a respective destination subscriber.

142. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises making an outgoing call to a respective destination subscriber of a received call, and linking said received and said outgoing calls.

143. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises connecting to a call as a third party.

144. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said ensuring comprises instructing said network to perform said connecting.

145. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said selecting is rule-based, in accordance with a state of at least one call-related parameter.

146. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, wherein said selecting is performed to select a call specified by a user.

147. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 137, further comprising starting said recording upon receipt of a trigger signal.

148. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 147, wherein said trigger signal is received prior to said call.

149. A method for remotely providing a service to selected telephone calls connected over a telephony network according to claim 147, wherein said trigger signal is received during said call.

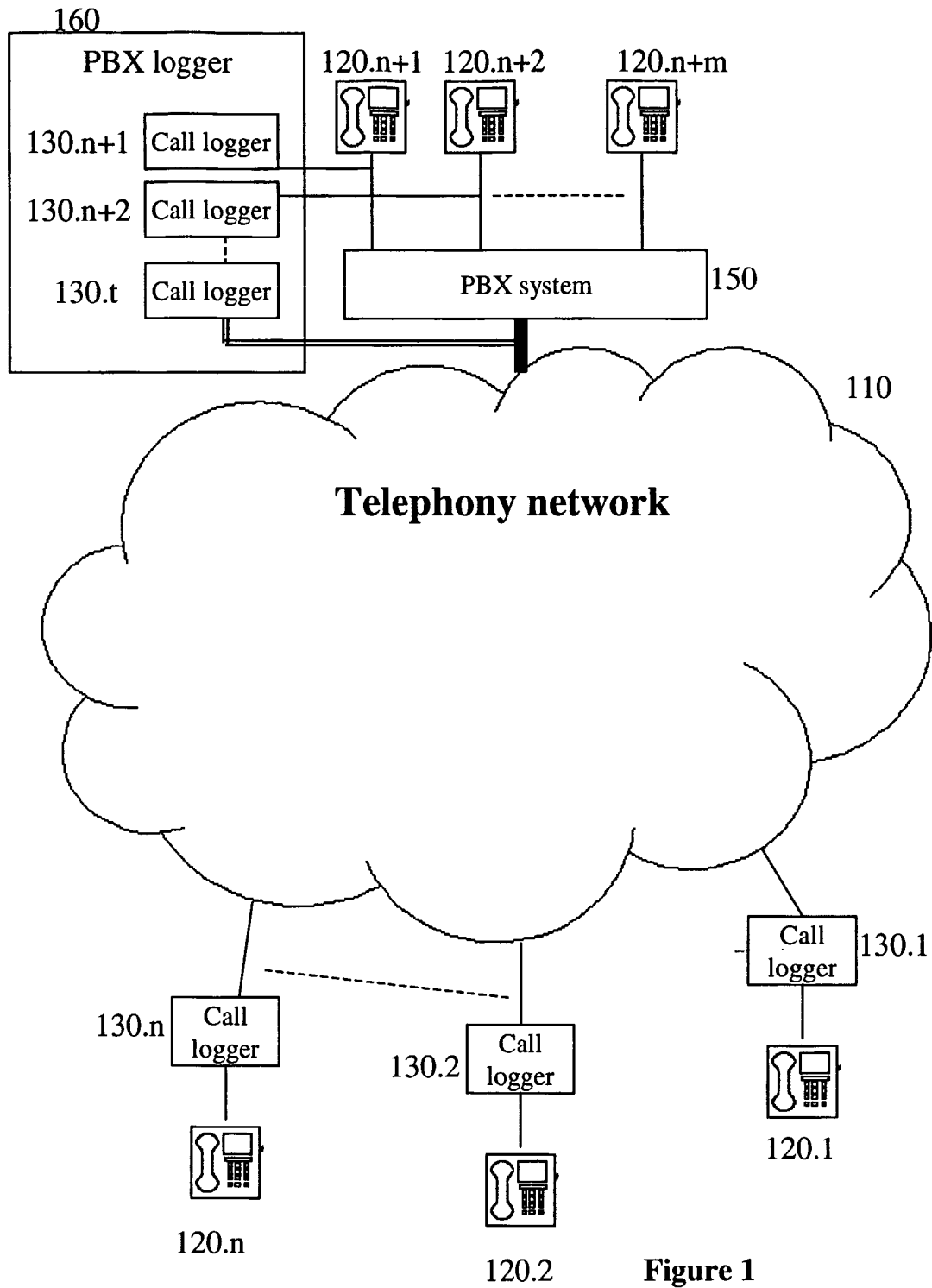


Figure 1

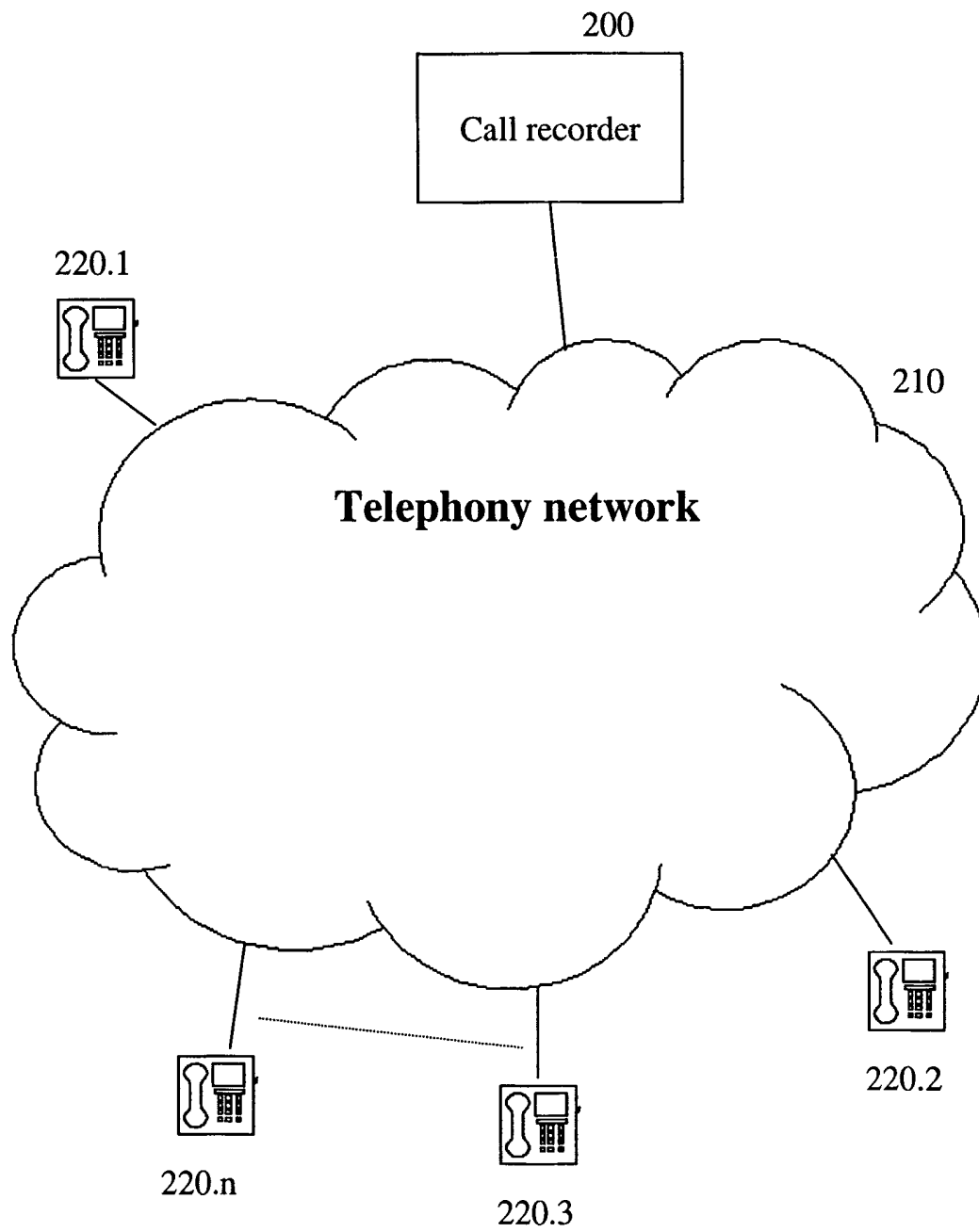


Figure 2

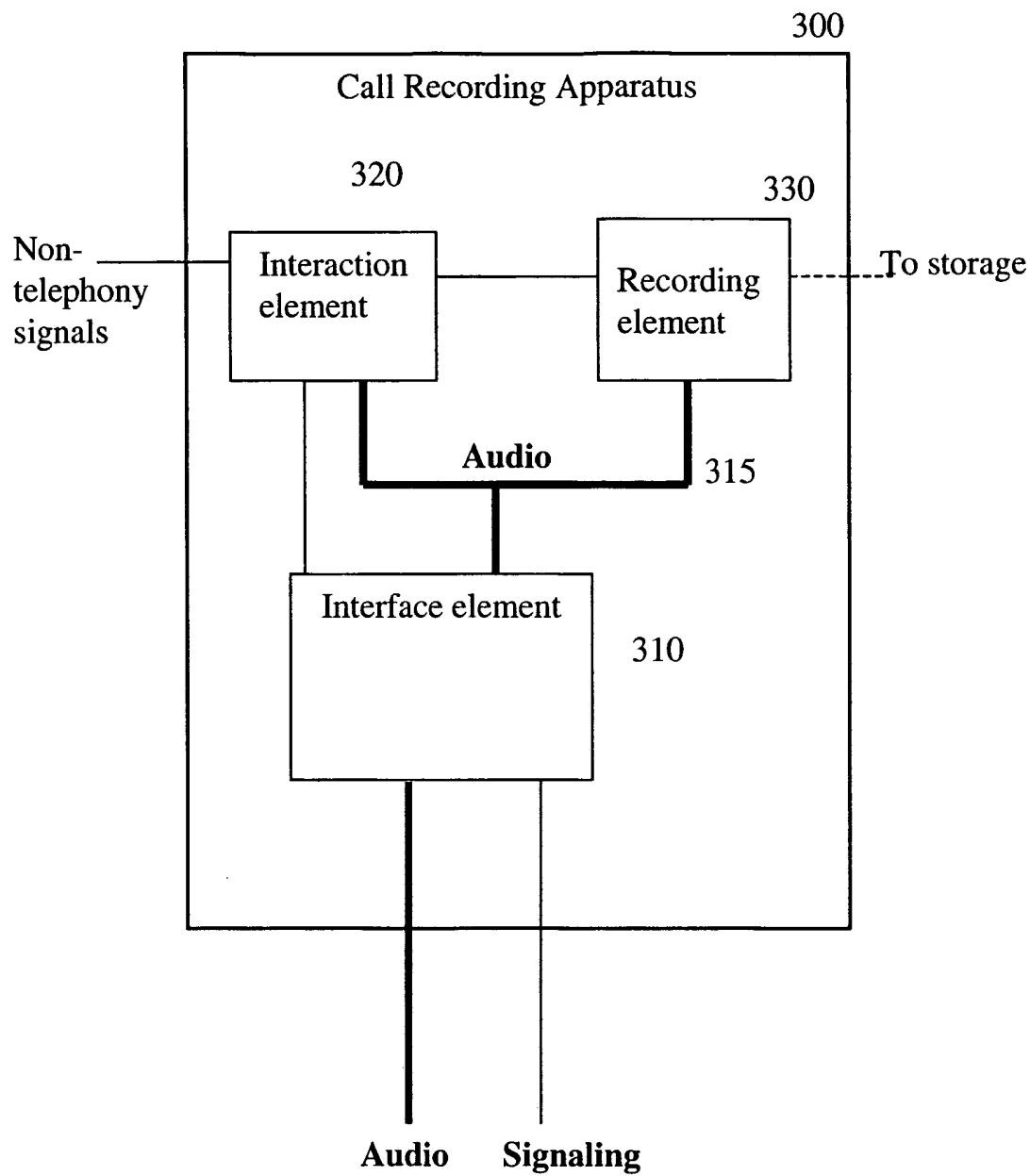


Figure 3

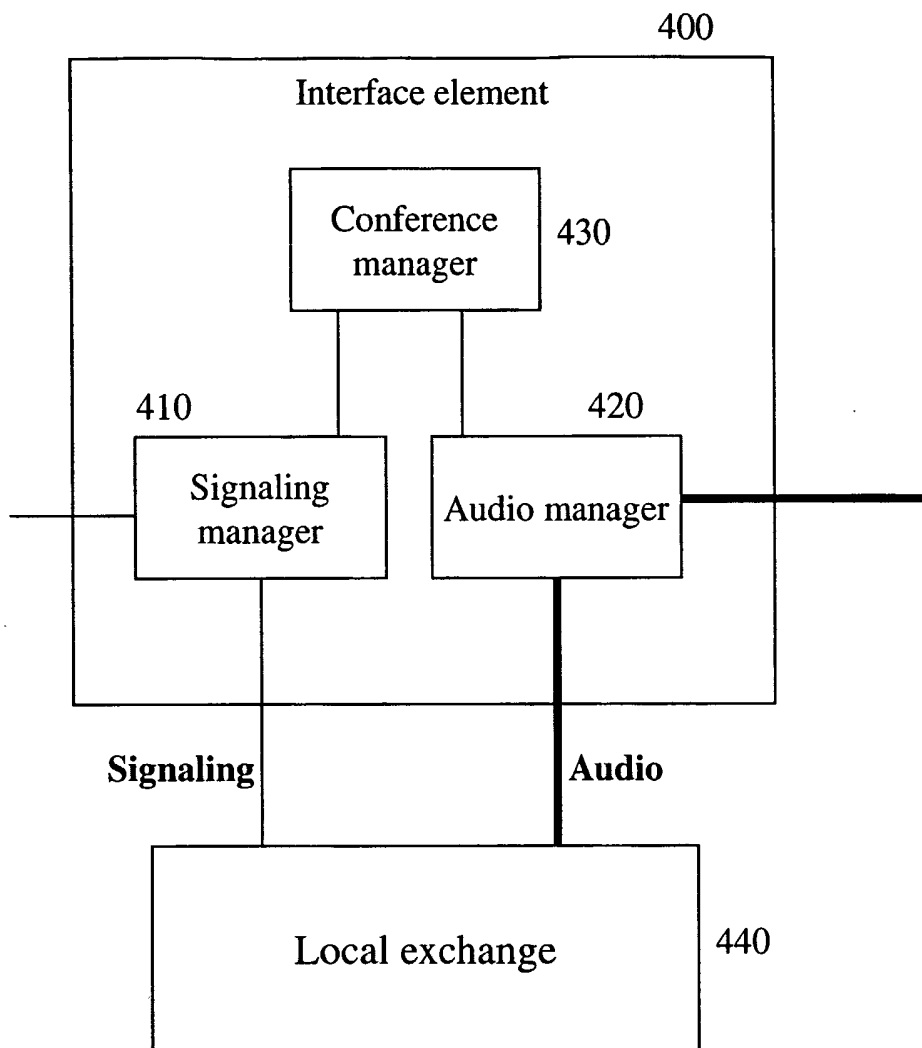


Figure 4

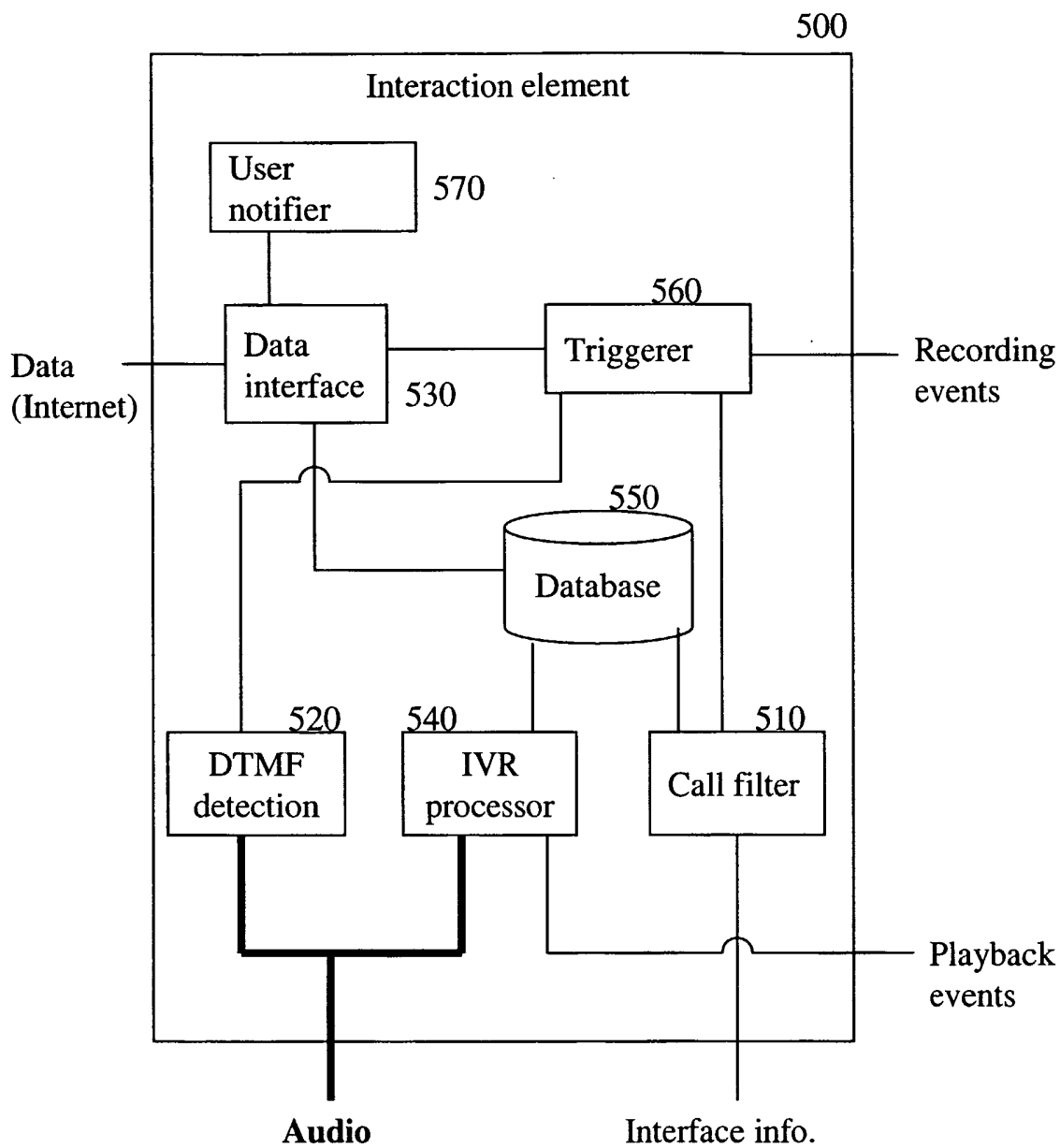


Figure 5

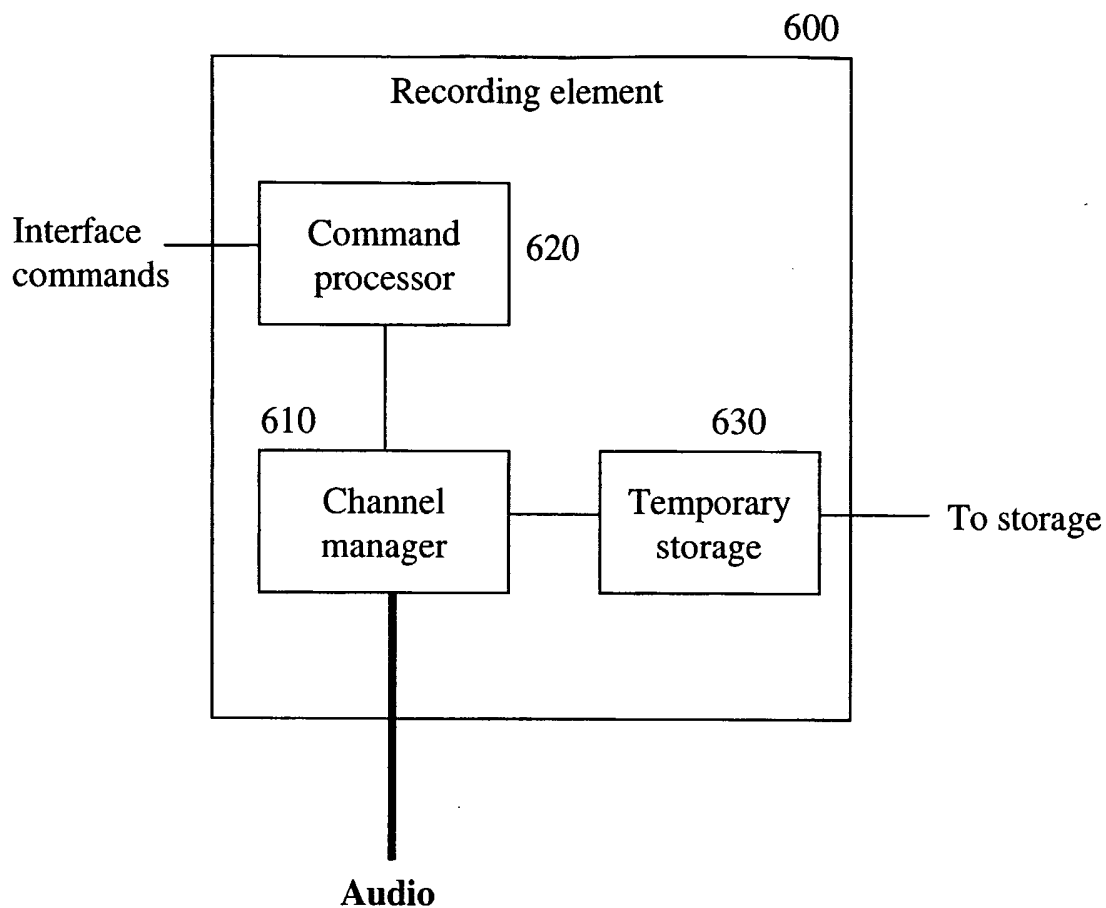


Figure 6

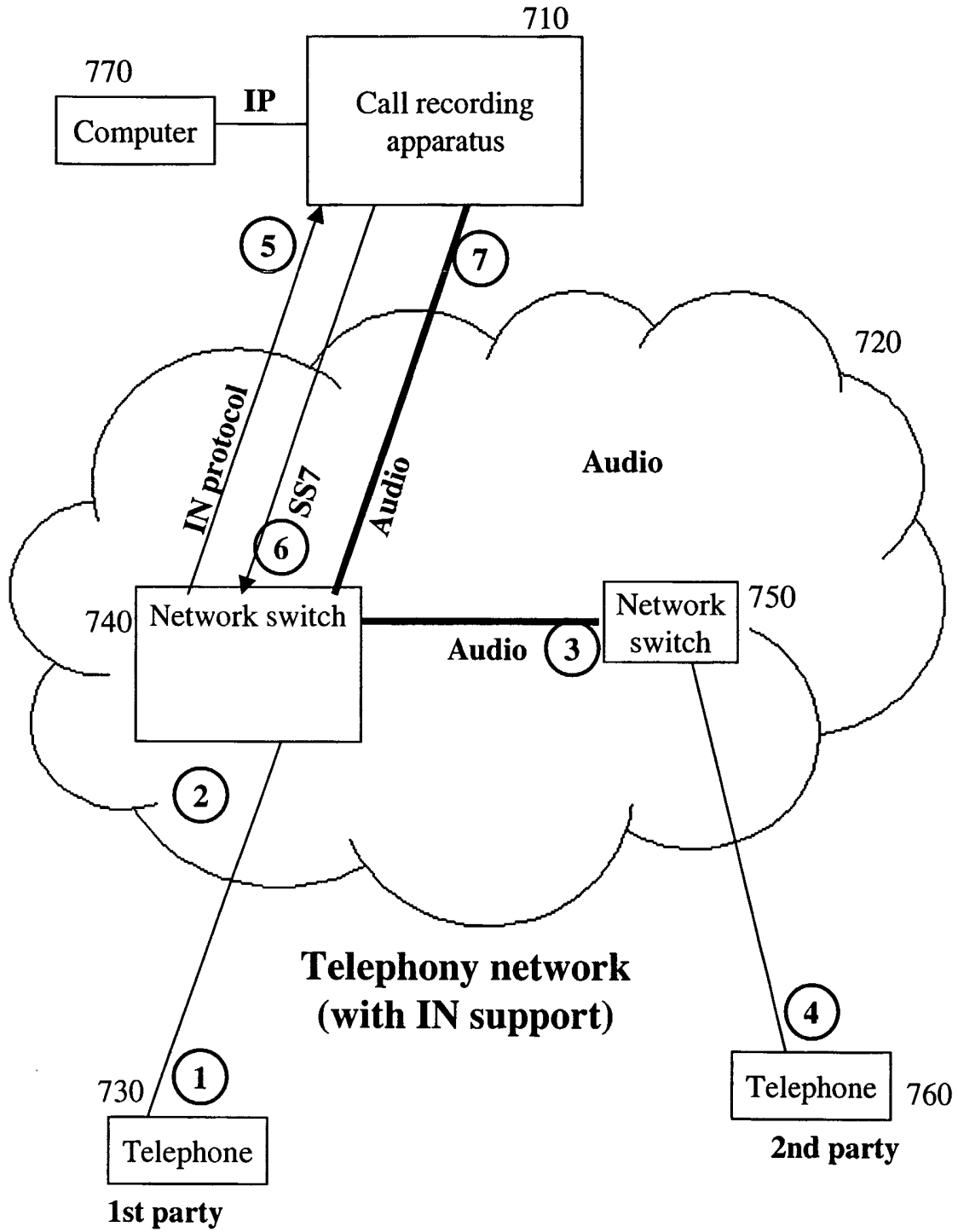


Figure 7

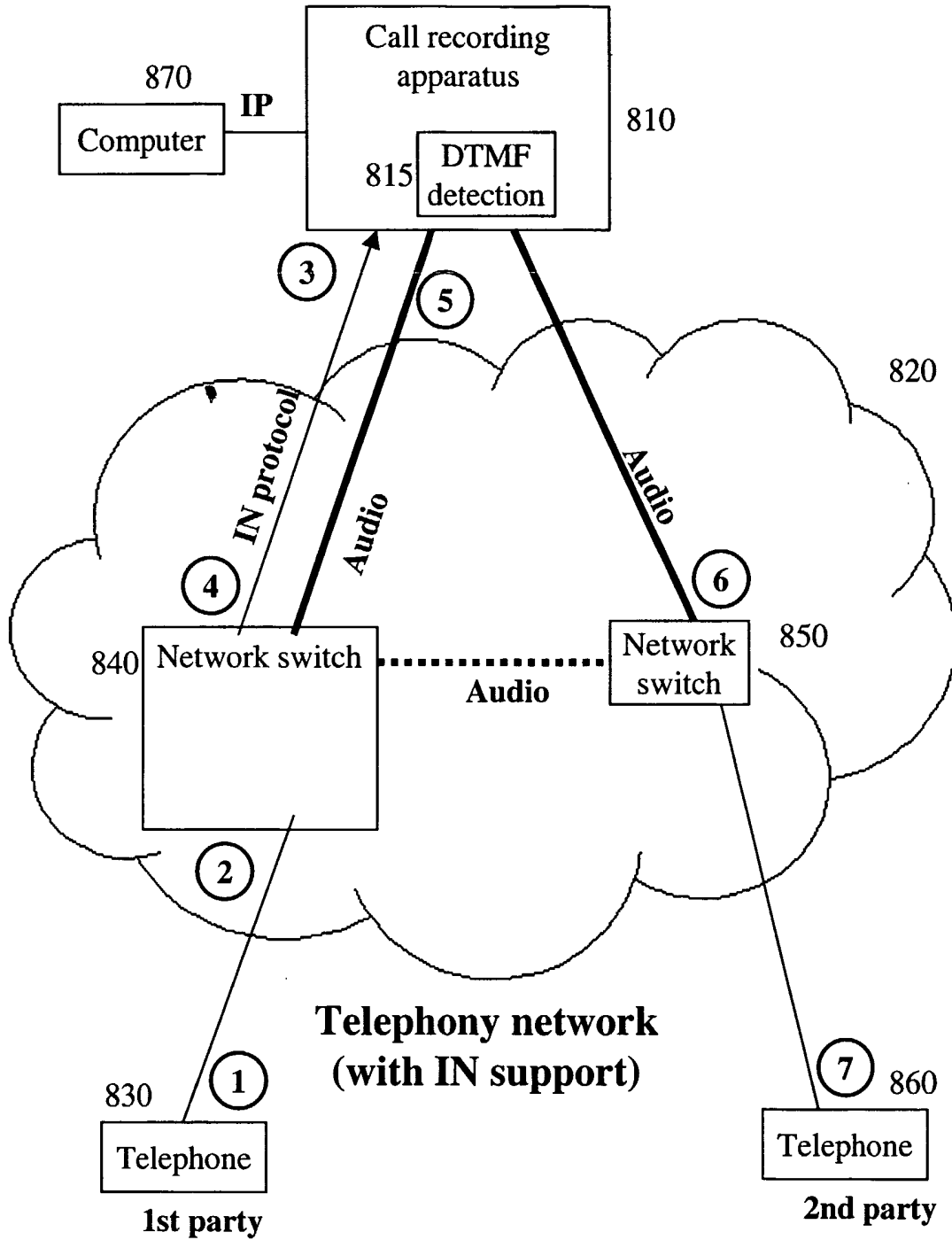


Figure 8

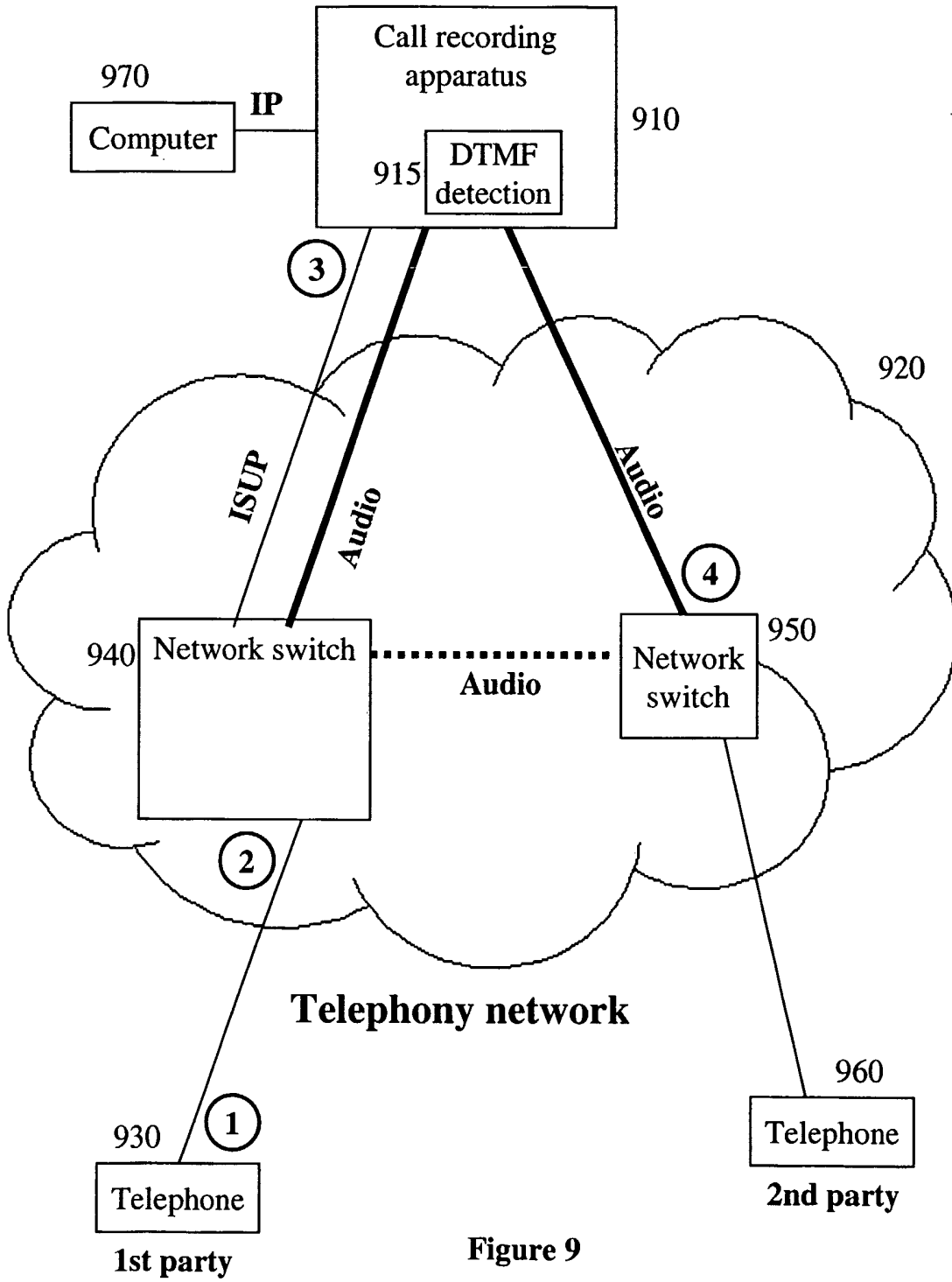


Figure 9

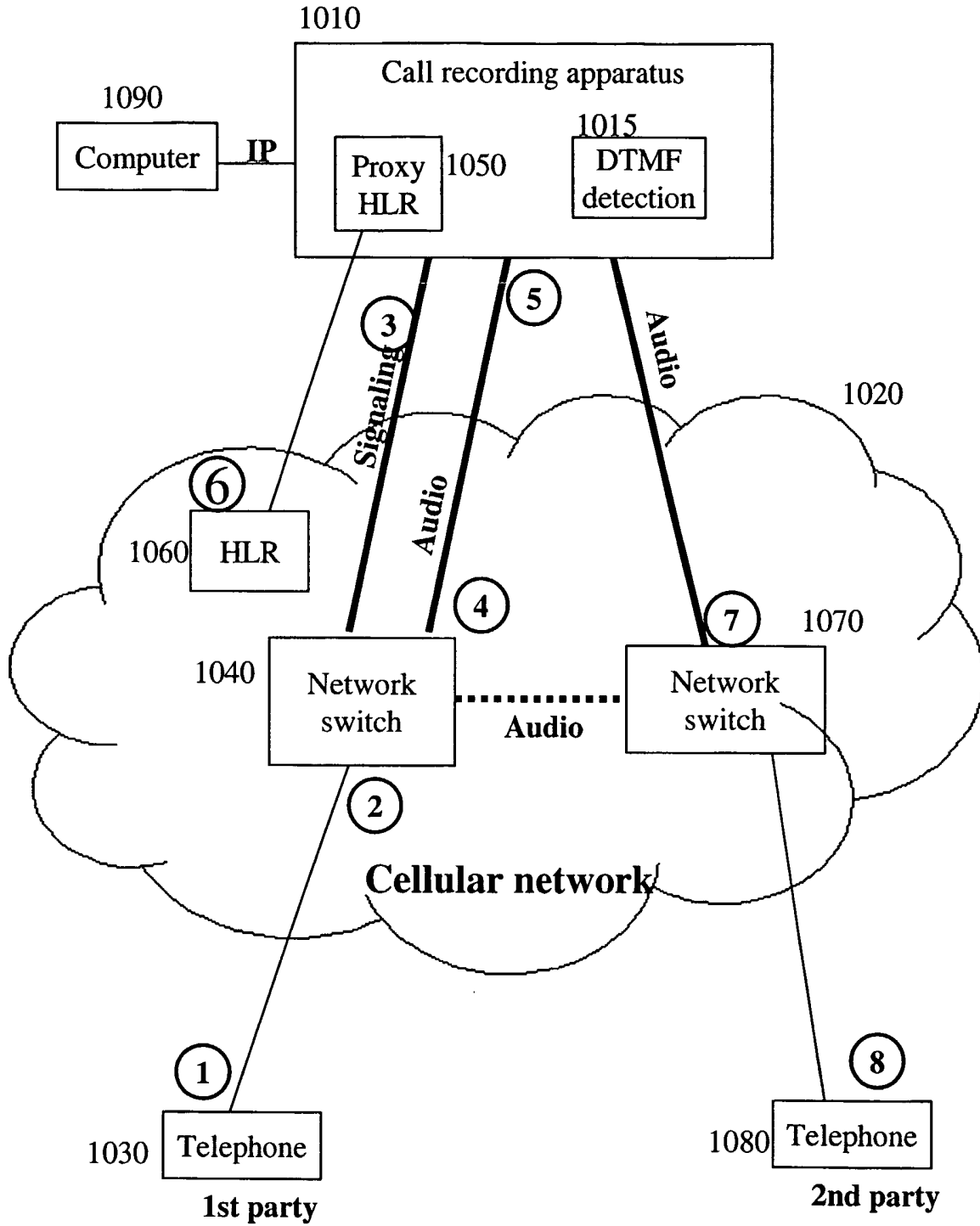


Figure 10

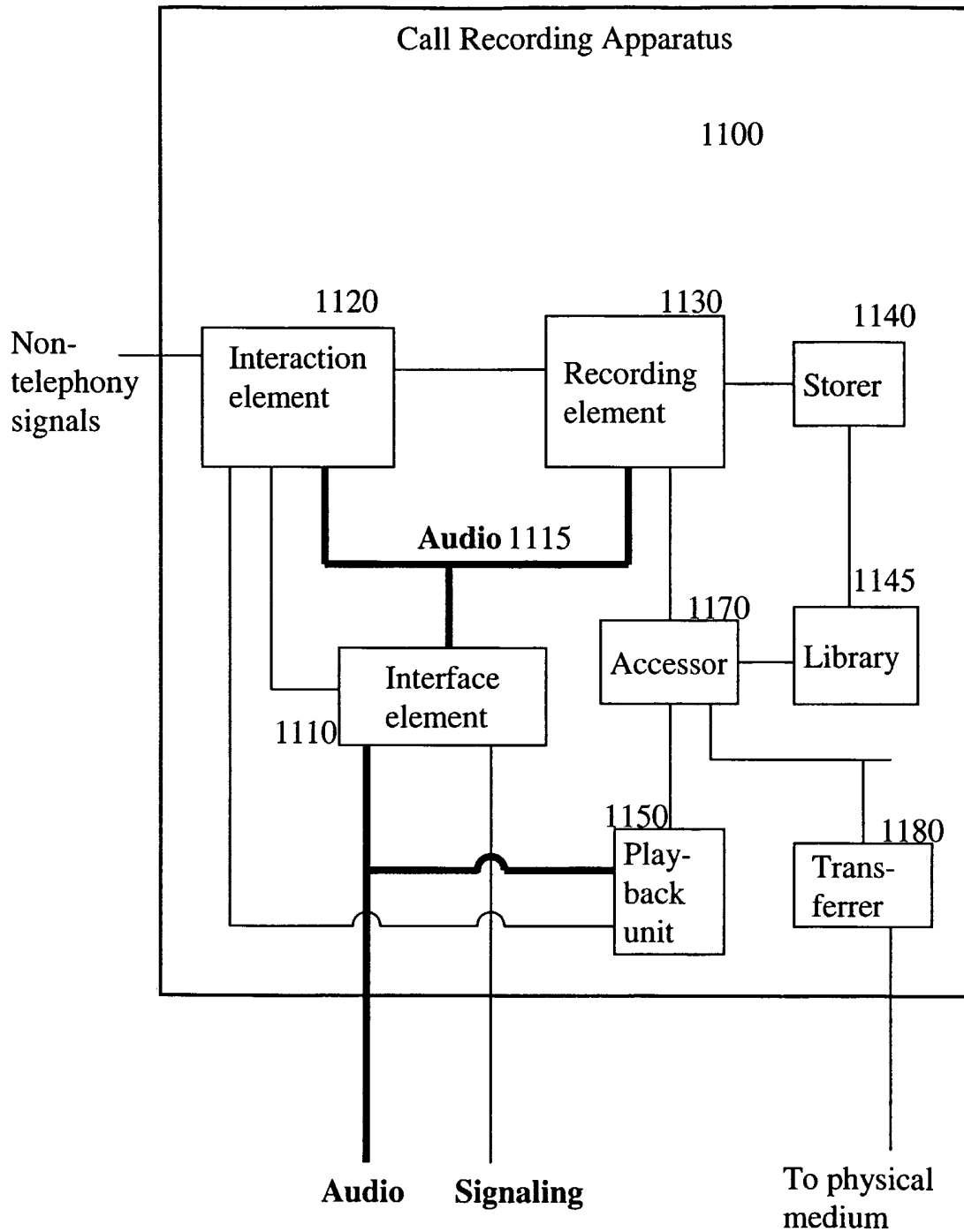


Figure 11

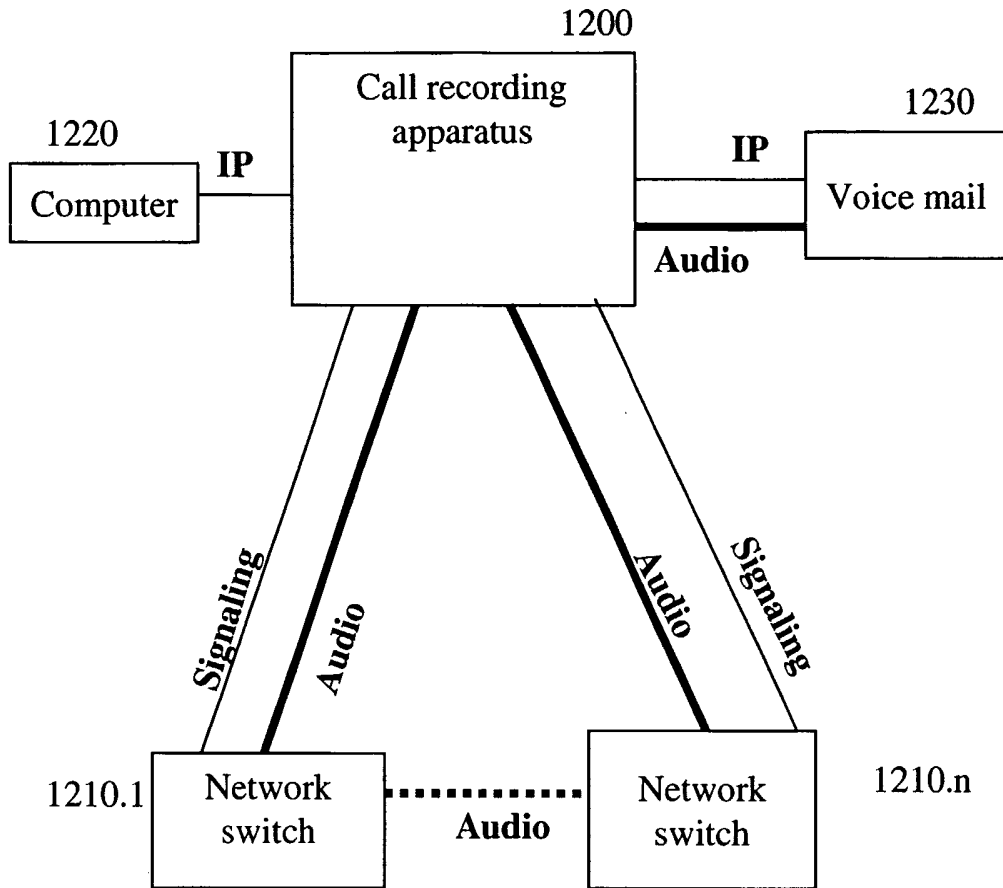


Figure 12

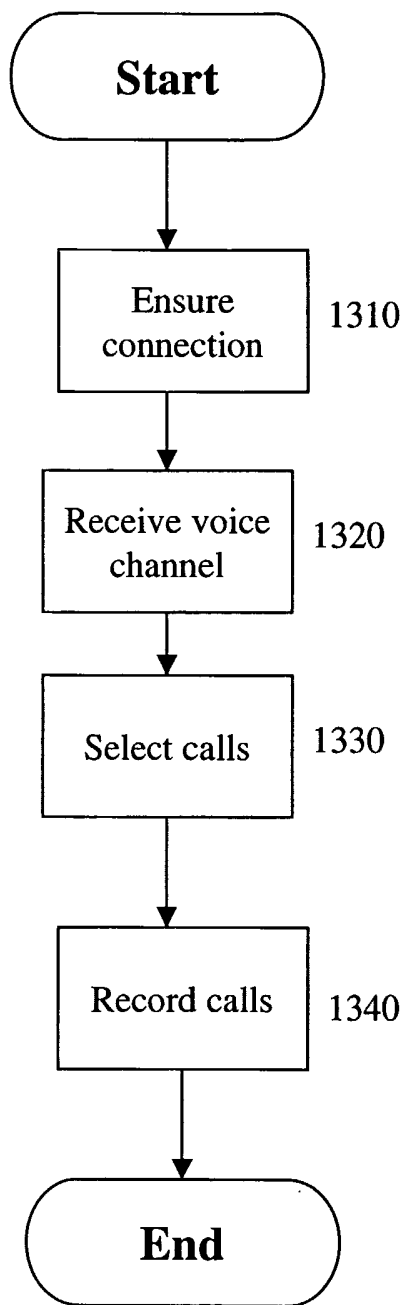


Figure 13

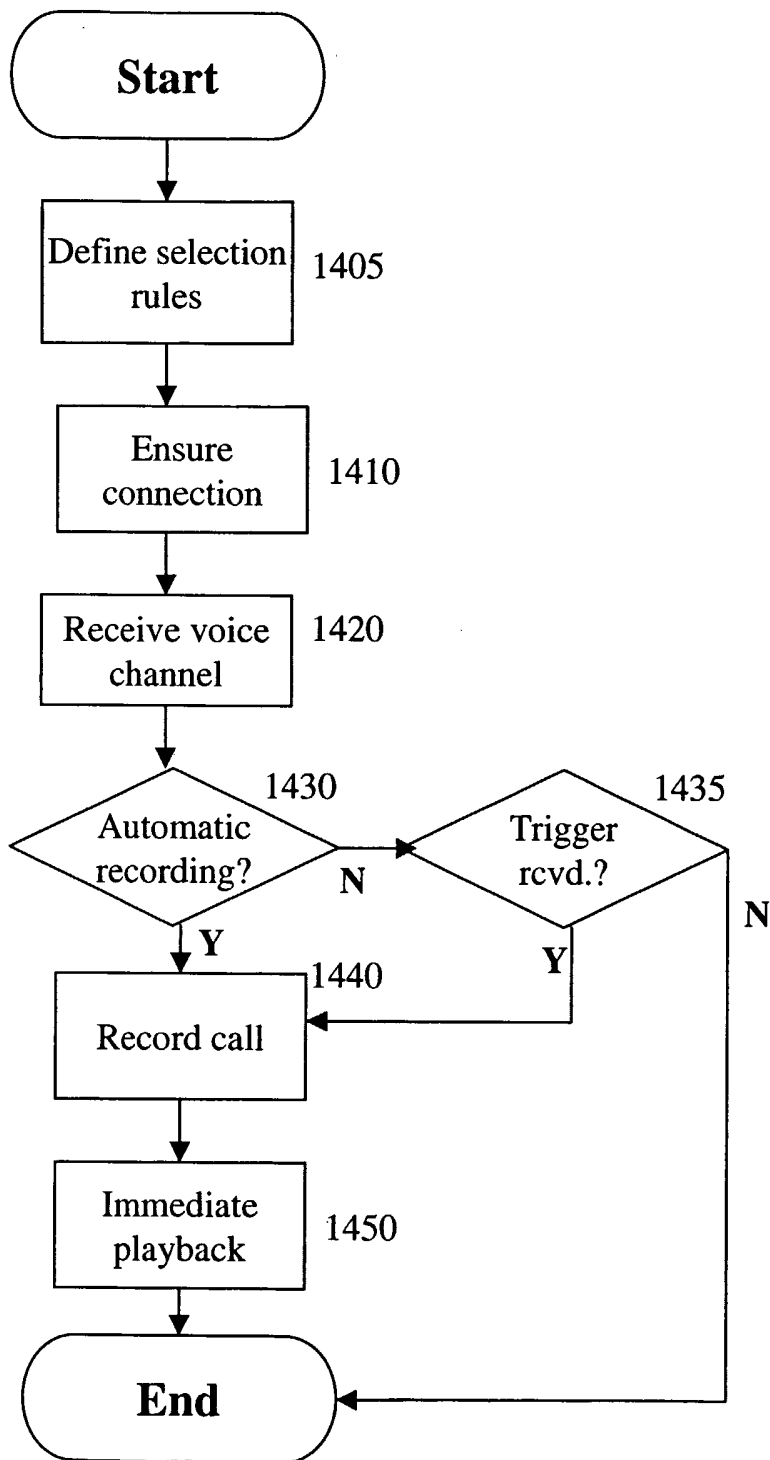


Figure 14

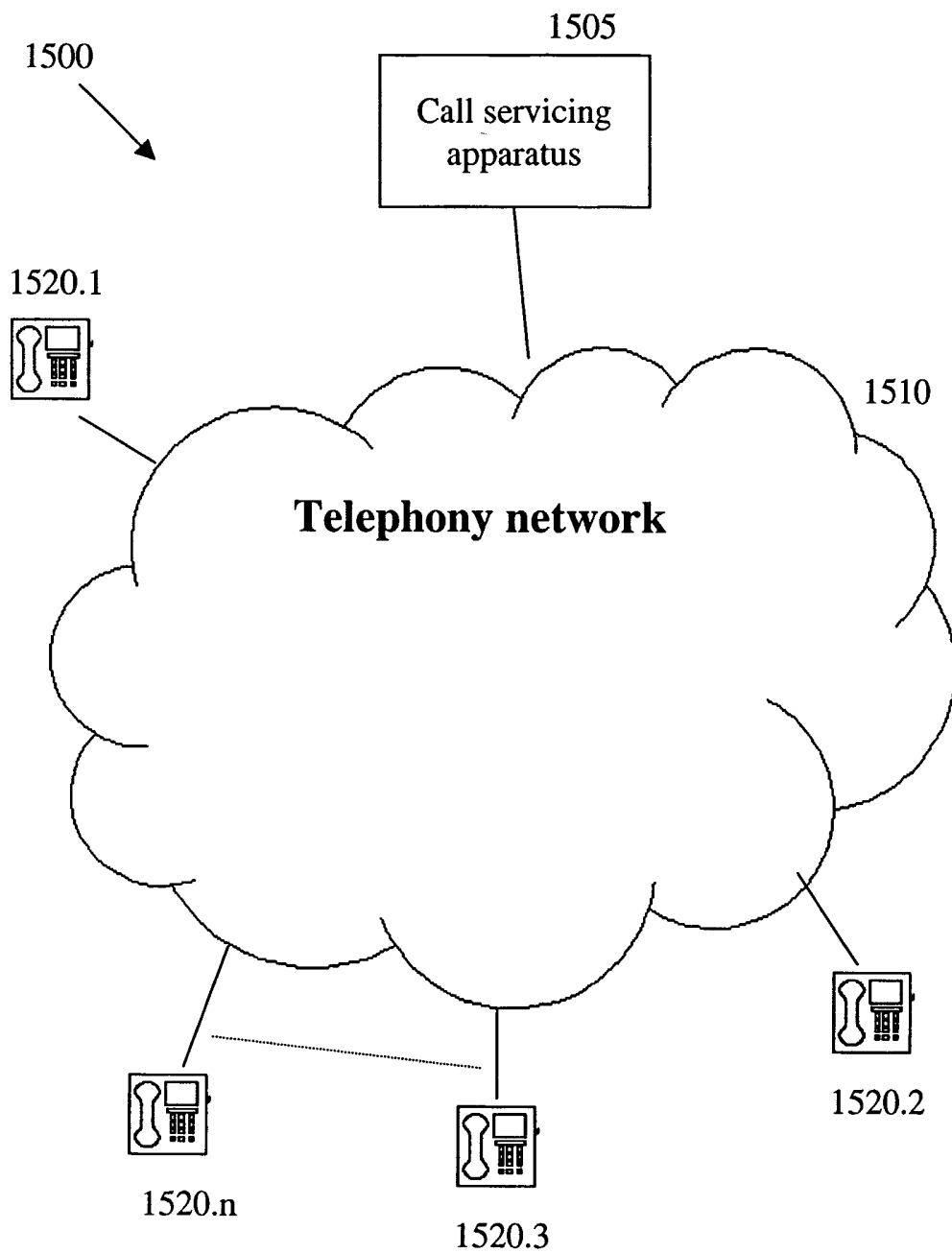


Figure 15

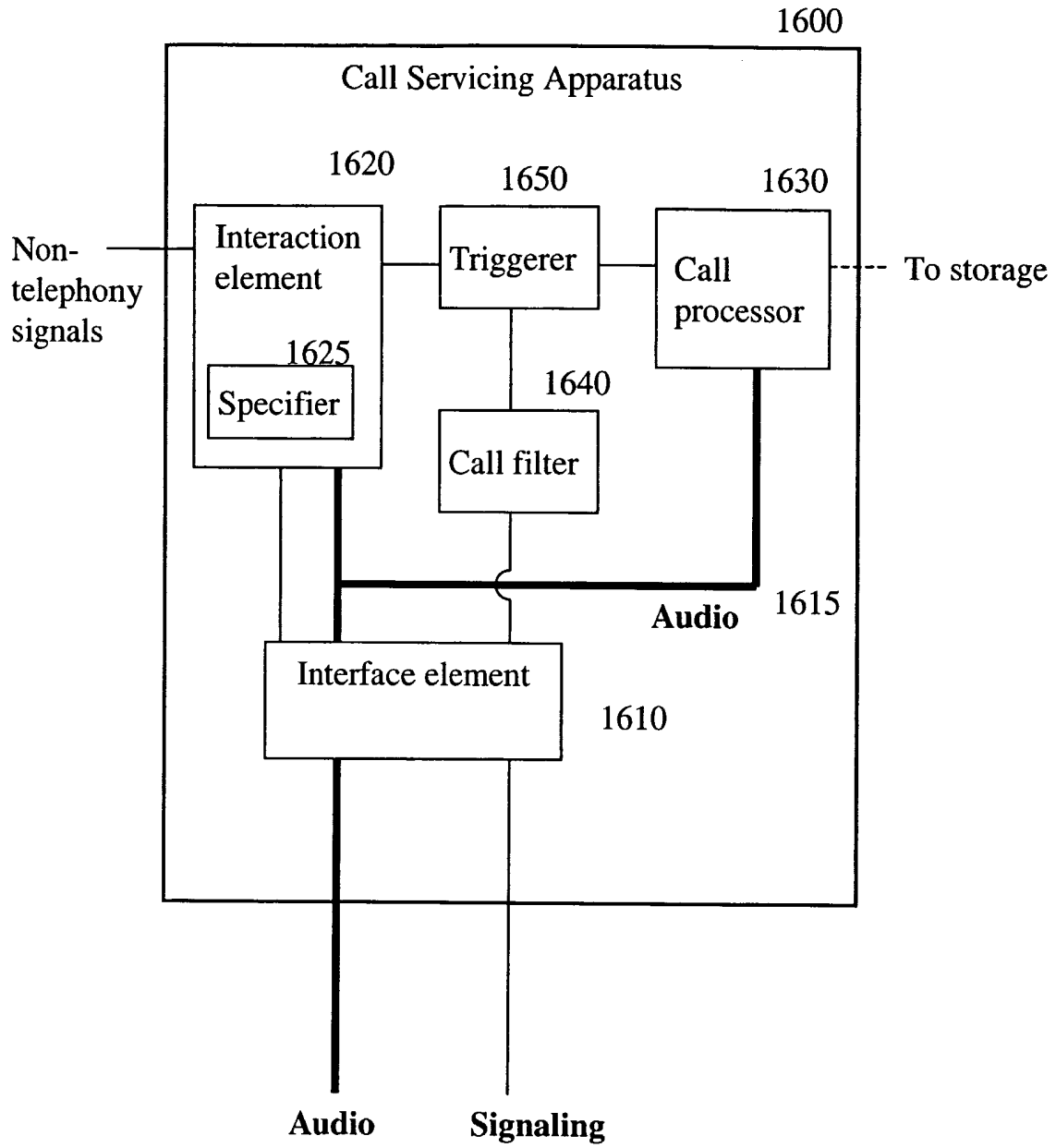


Figure 16

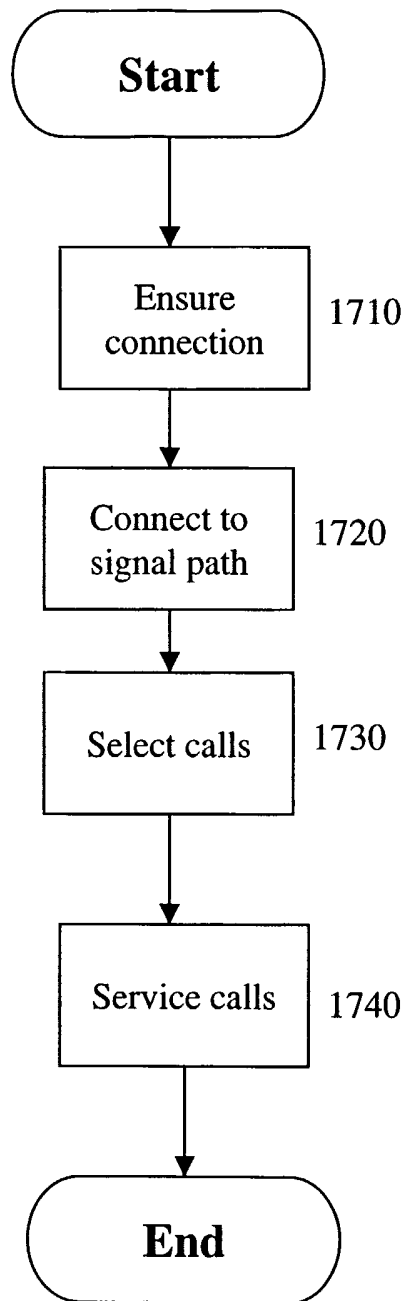


Figure 17

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/01088

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04M 3/42
 US CL : 379/88.25, 67.1, 68, 100.05, 93.25

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)
 U.S. : 379/88.25, 67.1, 68, 100.05, 93.25

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,E	US 6,668,044 B1 (SCHWARTZ et al) 23 December 2003 (23.12.2003), columns 6-14	1-149
X,P	US 6,661,879 B1 (SCHWARTZ et al) 09 December 2003 (09.12.2003), Figures 1-8	1-149
X	US 5,544,231 A (CHO) 06 August 1996 (06.8.1996), columns 3-7	1-149
X,P	US 6,529,602 B1 (WALKER et al) 04 March 2003 (04.3.2003), columns 5-13	1-149

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	
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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer Fan Tsang <i>Ruqenia Zogjan</i> Telephone No. 703-305-6900
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