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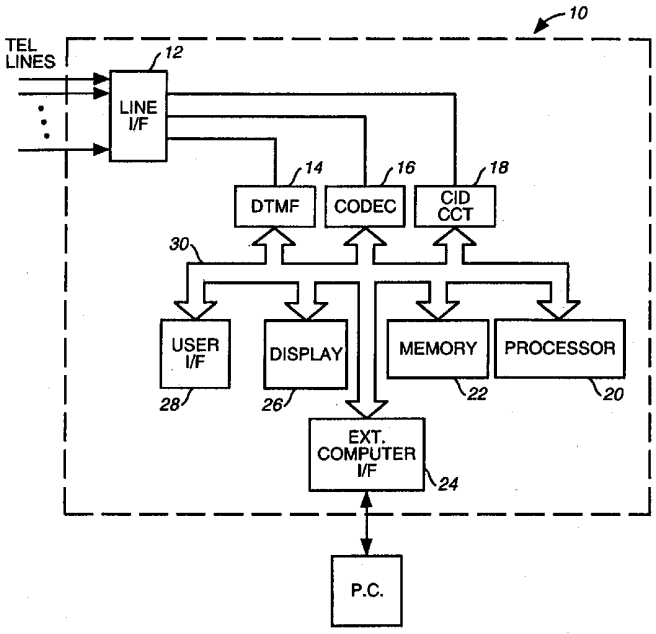

(57) Abstract: An intelligent telephone set (10) is disclosed that includes a caller-ID circuit (18) that extracts a call identifier from an incoming call. A call processing circuit (20) in communication with the caller-ID circuit (18) assigns the incoming call to a caller category associated with the call identifier. Subsequently, it selects a call processing action corresponding to the caller category and processes the incoming call using the selected call processing action. The intelligent telephone set (10) allows users to set criteria for receiving and processing calls based on CID data. One such call processing action is to use CID data to forward an incoming call to a predetermined location.

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AN INTELLIGENT TELEPHONE SET

The present invention relates generally to telephone devices, and particularly to an intelligent telephone set equipped with caller-ID and call forwarding capabilities.

The local exchange carriers (LECS) offer their customers various services such as caller ID (CID), call forwarding, and voice mail. Caller identification (CID) services are offered by the telephone companies to provide caller information to called parties. Typically, the CID is the caller's telephone number. The CID information is used to track incoming calls, to trace malicious and prank calls, to store identified numbers for re-dial, and to block unwanted calls. Most countries employ the 1200 baud Bell 202 standard or the CCITT V.23 FSK format to provide CID services.

In one approach that has been considered, a telecommunications device was equipped to receive and analyze packetized information preceding the incoming call. The packetized information identified the call as being either a speech type call or data type call. The device generated a distinct ringing tone for data messages, and another distinct ringing tone for speech data. Based on the tone, the device doubled as a telephone set and a facsimile machine.

In another approach that has been considered, the service provider used an ISDN network to provide a signaling channel

out of the voice band to transmit call forwarding information to the called party's telephone set. The call was forwarded without the called party having to answer the call. The call was also forwarded without having to interrupt an on-going call.

While the above mentioned applications are useful, they are quite limited in their use of CID information. What is needed is an intelligent telephone set that allows a user to set criteria for receiving and processing calls based on CID data stored in the telephone set. In addition, an intelligent telephone set is needed that is capable of using CID data to forward calls in accordance with the extracted CID data. Typically, network based call forwarding services have to be manually activated and inactivated by the user. This often results in users being charged for unwanted calls being forwarded to their wireless units. By using an intelligent telephone set that forwarded calls using CID data, users could bypass the call forwarding services offered by the local exchange carriers.

The present invention addresses the above stated problems. An intelligent telephone set is provided that allows users to set criteria for receiving and processing calls based on CID data. The intelligent telephone set of the

present invention also uses CID data to forward calls. The present invention provides CID, voice mail, and call-forwarding services while bypassing the Local Exchange Carriers (LECS). The present invention is applicable to the wireline network as well as the wireless network.

One aspect of the present invention is a telephone device for use in a telecommunications network. The telephone device is coupled to the telecommunications network by a plurality of telephone lines. The telephone device includes a caller-ID circuit operative to extract a call identifier from an incoming call propagating on a first telephone line of the plurality of telephone lines. A call processing circuit is coupled to the caller-ID circuit, the call processing circuit being operative to assign the incoming call to a caller category based on the call identifier, to select a call processing action corresponding to the caller category, and to process the incoming call in accordance with the selected call processing action.

In another aspect, the present invention includes a telephone set for use in a telecommunications network. The telephone set includes a caller-ID component coupled to the network, the caller-ID component is operative to extract a call identifier from an incoming call. A processor is coupled

to the caller-ID component. The processor is programmed to assign the incoming call to a caller category based on the call identifier, the caller category being one of a plurality of caller categories, and process the incoming call in accordance with one of a plurality of call processing routines, the processor selecting a call processing routine corresponding to the assigned caller category.

In another aspect, the present invention includes a telephone device for use in a telecommunications network. The telephone device is coupled to the telecommunications network by a plurality of telephone lines. The telephone device includes a database component having stored therein a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories. A caller-ID circuit is operative to extract a call identifier from an incoming call propagating on a first telephone line of the plurality of telephone lines. A call processing circuit is coupled to the caller-ID circuit and the database. The call processing circuit being operative to associate the incoming call to a caller category based on the call identifier association in the database, to select a call processing action corresponding to the caller category, and to process the incoming call in accordance with the selected call

processing action. A call forwarding circuit is coupled to the call processing circuit. The call forwarding circuit is operative to forward the incoming call to a predetermined telephone number over the second telephone line when the call identifier is associated with a predetermined caller category.

In another aspect, the present invention includes a telephone device for use in a telecommunications network. The telephone device is coupled to the telecommunications network by a plurality of telephone lines. The telephone device includes a database having stored therein data, the data including a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories. A caller-ID circuit is operative to extract a call identifier from an incoming call propagating on one of the plurality of telephone lines. A call processing circuit is coupled to the caller-ID circuit and the database. The call processing circuit is operative to associate the incoming call to a caller category based on the call identifier association in the database, to select a call processing action corresponding to the caller category; and to process the incoming call in accordance with the selected call processing action. A data entry component is coupled to the database, the data entry component being operative to add data

to the database, modify data in the database, or delete data from the database.

In another aspect, the present invention includes a method for processing an incoming telephone call using a telephone set. The telephone set is coupled to a telecommunications network by a plurality of telephone lines. The telecommunications network including both wireline networks and wireless networks. The method includes extracting a call identifier from the incoming call propagating on a first telephone line of the plurality of telephone lines. The incoming call is assigned to a caller category based on the call identifier. A call processing action is selected corresponding to the caller category. The incoming call is processed in accordance with the selected call processing action.

In another aspect, the present invention includes a method of providing and selecting from a menu on the display of a telephone set. The telephone set having a database, an instruction set, and a graphical user interface having a display and a data entry device. The method includes retrieving a set of menu entries from the menu. The menu entries are displayed on the display, each menu entry representing a telephone set maintenance operation. One menu

entry is selected from the set of menu entries on the display using the data entry device. The operation representing the selected menu entry is performed. A signal from the telephone set is transmitted, the signal being indicative of the selected menu entry.

In another aspect, the present invention includes a computer readable medium having stored thereon a database. The database includes a first portion having stored therein a plurality of caller identifiers. Each caller identifier being associated with one calling category of a plurality of calling categories. A second portion includes a library of ringing tones, each ringing tone being associated with one calling category of the plurality of calling categories. A third portion includes a record log for storing at least one call characteristic of at least one telephone call established between the telephone set and a remote destination telephone set.

In another aspect, the present invention includes a computer readable medium having stored thereon a data structure. The data structure includes an incoming caller identifier, a date of an incoming call, a time of the incoming call, and a caller category.

In another aspect, the present invention includes a

computer readable medium having stored thereon a data structure. The data structure includes a calling party identifier, a date of an outgoing call, a time of the outgoing call, a caller category, and a duration of the outgoing call. Additional features and advantages of the invention will be set forth in the detailed description which follows, and in part will be readily apparent to those skilled in the art from that description or recognized by practicing the invention as described herein, including the detailed description which follows, the claims, as well as the appended drawings.

It is to be understood that both the foregoing general description and the following detailed description are merely exemplary of the invention, and are intended to provide an overview or framework for understanding the nature and character of the invention as it is claimed. The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate various embodiments of the invention, and together with the description serve to explain the principles and operation of the invention.

Figure 1 is a functional block diagram of an embodiment of the present invention;

Figure 2A is a top view of the housing of one embodiment of the present invention;

Figure 2B is a perspective view of a wireless embodiment of the present invention;

Figure 3 is a diagrammatic depiction of the memory map in accordance with one embodiment of the present invention; and

Figure 4 is a flow chart showing call processing in accordance with one embodiment of the present invention.

Reference will now be made in detail to the present exemplary embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts. An exemplary embodiment of the telephone set of the present invention is shown in Figure 1, and is designated generally throughout by reference numeral 10.

In accordance with the invention, the present invention for an intelligent telephone set includes a caller-ID circuit operative to extract a call identifier from an incoming call propagating on a telephone line. A call processing circuit is coupled to the caller-ID circuit. The call processing circuit assigns the incoming call to a caller category based on the call identifier. The caller categories include important

calls, regular calls, and undesirable calls. However, the present invention allows the user to create any number of caller categories. After the incoming call has been assigned to a caller category, a call processing action is selected that corresponds to the caller category. The incoming call is processed in accordance with the selected call processing action. Thus, the intelligent telephone set allows users to set criteria for receiving and processing calls based on CID data. The intelligent telephone set also uses CID data to forward calls.

As embodied herein, and depicted in Figure 1, a functional block diagram of the intelligent telephone set 10 in accordance with one embodiment of the present invention is disclosed. Telephone set 10 includes line interface 12 which accommodates a plurality of telephone lines connected to the public telephone network. Line interface 12 is connected to DTMF transceiver 14, PCM codec 16, and caller ID circuit 18. Telephone set 10 also includes processor 20, memory 22, computer interface 24, display 26, and user interface 28. All of the above listed elements are coupled by system bus 30. Line interface 12 may be of any suitable type, but by way of example, interface 12 includes an integrated circuit, such as a Motorola MC34010P, coupled to isolation transformers. The

isolation transformers prevent grounding problems. As one of ordinary skill in the art will recognize, signals from the network are translated by interface 12 into signals having a correct format and amplitude. Interface 12 may also include a buffer amplifier and an adjustable potentiometer to provide optimal signal levels.

DTMF (dual tone multi-frequency) transceiver 14 is operative to generate and detect audible tones associated with a telephone network. DTMF 14 is also adapted to generate DTMF dialing tones to initiate a call through the telephone lines coupled to interface 12. DTMF 14 detects DTMF tones received from the telephone line via line interface 12.

PCM codec transceiver 16 uses a standard digitization scheme to band limit voice frequencies to the 300 - 3300Hz frequency band. Codec 18 performs an A/D conversion of an analog voice message using a :-law companding scheme. When sampling the analog waveform, larger amplitudes are compressed relative to the smaller amplitudes, providing an equivalent 12-bit accuracy within an 8-bit digital word. The 8-bit words generated by codec 18 can be stored in RAM 26, or in a memory resident in processor 22. In one embodiment, codec 16 includes a semiconductor IC manufactured by SGS Thompson or by the National Semiconductor Company having the product number

ETC5056, or equivalent.

Caller ID circuit 18 may be of any suitable type, but there is shown by way of example a single CID receiver chip 18. In one embodiment, CID receiver chip 18 is an integrated circuit that includes an A/D converter, a CID detection circuit, a gain adjusting circuit, a demodulator, and a serial-to-parallel buffer. The detection circuit in CID circuit 18 recognizes a channel seizure signal that alerts chip 18 that a CID mark signal will follow. After synchronizing with the mark signal, CID circuit 18 receives a CID data packet that includes CID information such as telephone number, name, date, time, and error correction information. After extracting the CID data, the serial-to-parallel buffer converts the CID data into digital words suitable for transmission on system bus 30.

In one embodiment, processor 20 is implemented using an off-the-shelf microprocessor such as a Pentium processor manufactured by Intel. In another embodiment, a DSP manufactured by Motorola or some other manufacturer is used. Those of ordinary skill in the art will also recognize that processor 20 can also be implemented using application specific integrated circuits (ASIC), or a combination of off-the-shelf processors and ASICs in the design.

Processor 20 is programmed to support conventional call handling functions. After CID circuit 18 extracts the CID information from an incoming call, processor 20 must process the incoming call based on the CID information. Among other things, processor 20 supports remote reprogramming, call forwarding, voice mail, and conference calls. In one embodiment, the conference call function supports two-or more lines with selective per-caller disconnect capability. In another embodiment, processor 20 includes a processor programmed to handle call processing, and another processor to accommodate the call forwarding processing. One of ordinary skill in the art will also recognize that in other embodiments certain call handling functions such as voice detection, pre-recorded voice responses, and voice mail are implemented as separate units within telephone set 10.

Memory 22 may be of any suitable type, but by way of example, memory 22 includes a read/write random access memory (RAM) used in data processing and data I/O, and a programmable read only memory for storing programming instructions and database information used by processor 20. One of ordinary skill in the art will recognize that the memory used to store the programming instructions and the data base may be implemented using a DRAM, PROM, EEPROM, a hard drive,

diskettes, a compact disk device, or any other computer readable medium. A diagrammatic depiction of a memory map in accordance with the present invention will be discussed in more detail below.

Computer interface 24 is adapted to communicate with an external computing device such as a personal computer. The programming instructions and/or database stored in memory 22 can be completely replaced or partially replaced with new instructions down loaded from the external computing device. One of ordinary skill in the art will recognize that data flow is bi-directional. For example, in one embodiment, processor 20 directs the personal computer to transmit an e-mail to a predetermined e-mail address via computer interface 24.

Display 26 may be of any suitable type, but by way of example, display 26 includes a liquid crystal display capable of displaying CID information, dialing information, the contents of the database, menu information, programming instructions, or any other information that can be displayed graphically.

User interface 28 may be of any suitable type, but there is shown by way of example an input/output circuit coupled to system bus 30. User interface 28 is connected to the telephone's twelve-key dialing device, a function key set, a

keyboard for data entry and programming functions, a speaker, and a microphone.

As embodied herein and depicted in Figure 2A, a top view of the telephone set housing 100 in accordance with one embodiment of the present invention is disclosed. Housing 100 may be formed using a hard plastic material. In the embodiment depicted in Figure 2A, housing 100 accommodates a standard telephone receiver 280, twelve-key dialing device 282, keyboard 284, line selection device 286, display 26, speaker 288, and microphone 290. One of ordinary skill in the art will recognize that other housing arrangements are possible within the scope of the present invention. Twelve-key dialing device 282 includes digits 0-9, the "*" key, and the "#" key. In one embodiment, keyboard 284 includes function keys F1 - F12, control keys (such as an insert key, a delete key, a return key, and etc), and the basic character keys. Line selection device 286 includes a plurality of keys allowing the user to select one of the plurality of telephone lines connected to intelligent telephone set 10. In one embodiment, line select portion 286 also includes an interrupt button, a speaker-phone button, and a conference-call button. The interrupt button allows the user to interrupt voice-mail and communicate directly with a

calling party.

As embodied herein and depicted in Figure 2B, a perspective view of a wireless embodiment 10 of the present invention is disclosed. Wireless telephone set 10 includes handset 280, twelve-key dialing device 282, keyboard 284, and liquid crystal display 26.

As embodied herein and depicted in Figure 3, a diagrammatic depiction of the memory map in accordance with one embodiment of the present invention is disclosed. Memory 22 includes programmable instruction set 220 and database 222. One of ordinary skill in the art will recognize that programmable instruction set 220 is a subset of the total instruction set used by processor 20. When accessing programmable instruction set 220, the user employs display 26 and keyboard 284 (shown in Figure 2) to retrieve a main menu that lists a set of menu entries.

The set of menu entries displayed has entries including a listing of programmable instruction set 220, programming choices for programmable instruction set 220, the contents of database 222, and database programming options. After the menu entries are displayed, the user selects one menu entry on the display. For example, a cursor key in combination with the enter key can be used to perform the selection step. In

another embodiment, a mouse is provided to allow the user to double-click on the selected entry. In yet another embodiment, a track-ball mechanism is used in the selection process.

After the selection is made, the menu programming transmits a signal to the user indicating the menu selection. In one embodiment, the signal includes both a visual signal shown on display 26 and an audio signal transmitted via speaker 288.

Subsequently, the user performs programming, searching and data entry tasks using keyboard 284. The menu system described above allows the user to search programmable instruction set 220 and database 222, and modify programmable instruction set 220 and database 222. Modification of set 220 and database 222 includes making additions, deletions, or merely changing some characteristic of the stored instruction or data.

Referring again to Figure 3, database 222 includes a directory storage database 224, a library of ringing tones 226, and record log 228. Directory storage database 224 associates caller-ID information to a caller category. In one embodiment, the caller categories include an important call category, a regular call category, and a undesirable call

category. The important call category is a "hot list" that may include family, friends, business associates or other VIPs that may considered import to the user. The regular category may include other less important people, associates, or businesses. The regular category is also the default category. If an incoming call includes CID information not stored in the database, processor 20 processes the call as a regular call. The undesirable category includes people, businesses, or associations that the user does not want to talk to. As discussed above, one of ordinary skill in the art will recognize that the present invention should not be construed as being limited to only three caller categories. Any number of categories can be created using the present invention. The number of categories is user defined. The number of entries in each category is also user defined, and depends the amount of memory included in device 10.

Database 226 includes a library of ringing tones. The ringing tone selected for each category is programmable by the user. Processor 20 can be programmed to employ a unique ringing pattern for each call category. For example, processor 20 may retrieve a "category 1" ringing tone when CID circuit 18 determines that the incoming call is in the important call category. Processor 20 may also be programmed

to select category X ringing tone for the undesirable call category. In the example shown in Figure 3, there are "X" tones available. X is an integer number that depends on the size of memory 22.

Database 222 also includes record log 228, which includes an incoming call portion and an outgoing call portion. In one embodiment, the incoming call record log employs data structure 230 which includes CID information, the date of the incoming call, the time of the incoming call, and the category of the incoming call. The outgoing call record log uses data structure 232 which includes a called party ID, date of the outgoing call, time of the outgoing call, and the duration of the call. In one embodiment, the stored CID information is configured to include a name, business association when applicable, telephone number, area code, and country code. One of ordinary skill in the art will recognize that the present invention is flexible in that any number of data structures can be used to build record log 228. Using the menu system described above, the record log can be retrieved, searched, or sorted. For example, a user may want to view the incoming calls chronologically. On another occasion, the user may want to determine the CID of the party with the highest frequency of incoming calls. One of ordinary skill in the art

will recognize that the present invention should not be construed as being limited to these examples.

As embodied herein and depicted in Figure 4, a flow chart showing call processing in accordance with an embodiment of the present invention is disclosed. In step 302, CID circuit 18 extracts the CID information from the incoming call. In step 304, processor 20 compares the extracted CID with the stored CID data in database 224. Subsequently, processor 20 uses the CID data to determine the appropriate call category.

In step 306, processor 20 determines whether the CID is in the important category. If it is, processor 20 retrieves the distinctive ringing tones associated with the important call category from the library of tones stored in database portion 226. In step 310, processor 20 allows telephone set 10 to ring for a predetermined number of times before determining that the party being called is not available. Of course, the number of times the phone rings is programmed by the user using the menu system described above. If the call is answered by the party being called, all further call processing is terminated. However, processor 20 will record the call characteristics in record log 228 using data structure 230 (See Figure 3).

If the call is not answered, processor 20 performs step 312. In step 312, processor 20 retrieves an audible menu system that gives the calling party several options. The calling party can choose to have its call forwarded. If the calling party is the user himself, he can enter a system password, and the menu system will allow the user to program intelligent telephone set 10 from a remote location. If the calling party requests the call forwarding option, one of the plurality of telephone lines connected to line interface 12 is seized, and an attempt is made to establish a call with a preprogrammed number stored in memory.

In step 314, if the call forwarding attempt is not successful, processor 20 retrieves a voice message from memory 22 and informs the calling party that the call forwarding attempt was unsuccessful. The incoming call is hen forwarded to the voice mail system. Depending on the programming selections made by the user, step 318 causes processor 20 to send either a page, a wireless message, or an e-mail to the part that was called. Finally, in step 332, processor 20 records the call characteristics in record log 228 using data structure 230 (See Figure 3).

Referring back to step 306, if processor 20 determines that the extracted CID is not in the important category, it

then determines in step 322 whether the extracted CID is in the undesirable category. Note that if an incoming call is not in the undesirable category, processor 20 assume that it is in the regular category, since the regular category is the default category. While this example shows a system accommodating only three categories, one of ordinary skill in the art will recognize that the present invention can be programmed to accommodate four or more categories.

If the incoming call is not in the undesirable category, processor 20 retrieves the distinctive ringing tones associated with the regular category from the library of tones stored in database portion 226. In step 328, processor 20 allows telephone set 10 to ring for a predetermined number of times before determining that the called party is not available. If the call is not answered, processor 20 retrieves a voice message from memory 22 informing the calling party that there is no one available to answer the call, and processor 20 forwards the incoming call to the on-board voice mail system. Obviously, the user may set the predetermined number of times to zero is he so desires. He can then review his voice mail at some point in the future.

If the call is answered by the party being called, all further call processing is terminated in step 320. However,

processor 20 will again record the call characteristics in record log 228 using data structure 230.

Referring back to step 322, if processor 20 determines that the incoming call is an undesirable call, processor 20 retrieves the distinctive ringing tone associated with the undesirable category from the library of tones stored in database portion 226. In step 336, processor 20 allows telephone set 10 to ring for a short period, such as two rings, signaling anyone within listening range that an undesirable call is being processed by intelligent telephone set 10. In the next step, processor 20 retrieves a voice message from memory 22 informing the calling party that there is no one available to answer the call. In step 340, processor 20 disconnects the incoming call. Finally, processor 20 will record the call characteristics of the undesirable call in record log 228 using data structure 230. When a user places an outgoing call, processor 20 is also programmed to retrieve the telephone number of the called party. As shown in Figure 3, processor 20 writes the called party's ID, the date of the outgoing call, the time of the outgoing call, and the duration of the call in the outgoing record log 228 using data structure 232. One of ordinary skill in the art will recognize that many variations of this

system can be implemented within the scope of the present invention. In one embodiment, processor 20 uses the telephone number of the called party to retrieve associated data from the data base. For example, the telephone number may be associated with a name, a business, or any other amplifying or miscellaneous data.

One of ordinary skill in the art will recognize that the method depicted in Figure 4 is user defined and can be modified in any number of ways to suit the desires of the user. For example, the user may wish to forward, activate or deactivate the call forward, or change the ring tone for each or any group at any time.

It will be apparent to those skilled in the art that various modifications and variations can be made to the present invention without departing from the spirit and scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is

1. A telephone device for use in a telecommunications network, the telephone device being coupled to the telecommunications network by a plurality of telephone lines, the telephone device comprising:

a caller-ID circuit operative to extract a call identifier from an incoming call propagating on a first telephone line of the plurality of telephone lines; and

a call processing circuit coupled to the caller-ID circuit, the call processing circuit being operative to assign the incoming call to a caller category based on the call identifier, to select a call processing action corresponding to the caller category, and to process the incoming call in accordance with the selected call processing action.

2. The device of claim 1, wherein the call processing action includes forwarding the incoming call to a predetermined destination over a second telephone line of the plurality of telephone lines.

3. The device of claim 1 or 2, wherein the call processing action includes forwarding the incoming call to a

voice mail system.

4. The device of any one of claims 1-3, wherein the call processing action includes disconnecting the incoming call.

5. The device of any one of claims 1-4, further comprising:

a voice mail component coupled to the call processing circuit;

a ring generator coupled to the call processing circuit;

a computer interface coupled to the call processing circuit; and

a memory, the memory including,

a first look-up table having stored therein at least one caller identifier, each at least one caller identifier being associated with one calling category of a plurality of calling categories,

a second look-up table including a library of ringing tones, each ringing tone being associated with one calling category of the plurality of calling categories, and

a record log for storing at least one call characteristic of at least one telephone call established between the telephone set and a remote destination telephone set.

6. The device of claim 5, wherein the plurality of

calling categories includes an important call category, a regular call category, and an undesirable call category.

7. The device of claim 6, wherein the ring generator sounds a first distinctive ringing tone when the call identifier of the incoming call is associated with the important call category, the first distinctive ringing tone being retrieved from the library of ringing tones in the second look-up table.

8. The device of claim 6, wherein the incoming call is forwarded to a predetermined party over the second telephone line when the call identifier is associated with the important call category.

9. The device of claim 8, wherein an e-mail message is transmitted to a predetermined e-mail address via the computer interface when a connection is not established with the predetermined party.

10. The device of claim 8, wherein a pager message is transmitted to a predetermined paging address over a second telephone line of the plurality of telephone lines when a

connection is not established with the predetermined party.

11. The device of claim 8, wherein the incoming call is forwarded to the voice mail component when a connection is not established with the predetermined party.

12. The device of claim 6, wherein the regular call category is a default category, such that an incoming call having a call identifier not stored in the first look-up table is processed as a regular call.

13. The device of claim 6, wherein the ring generator sounds a second distinctive ringing tone when the call identifier of the incoming call is associated with the regular call category, the second distinctive ringing tone being retrieved from the library of ringing tones in the second look-up table.

14. The device of claim 13, wherein the incoming call is forwarded to the voice mail component when the call identifier is associated with the regular call category.

15. The device of claim 6, wherein the ring generator

sounds a third distinctive ringing tone when the call identifier of the incoming call is associated with the undesirable call category, the third distinctive ringing tone being retrieved from the library of ringing tones in the second look-up table.

16. The device of claim 15, wherein the incoming call is disconnected when the call identifier of the incoming call is associated with the undesirable call category.

17. The device of claim 15, wherein the voice mail component transmits a pre-recorded message to a calling party before disconnecting the incoming call.

18. The device of claim 5, wherein the ring generator sounds a fourth distinctive ringing tone when the device is connected to a computer via the computer interface, and the computer is coupled to the internet via one of the plurality of telephone lines.

19. The device of claim 5, wherein the call processor stores the at least one call characteristic for each incoming call in the record log.

20. The device of claim 19, wherein the at least one call characteristic includes a telephone number, a date of the incoming call, a time of the incoming call, and the category of the incoming call.

21. The device of claim 19, wherein the call processor stores the at least one call characteristic for each incoming call in the record log for at least thirty days.

22. The device of claim 5, wherein the call processor stores the at least one call characteristic for each outgoing call in the record log.

23. The device of claim 22, wherein the at least one call characteristic includes a called party identifier, a date of the outgoing call, a time of the outgoing call, and a duration of the outgoing call.

24. The device of claim 1, further comprising:

a memory coupled to the call processor, the memory being operative to store device programming instructions;

a user interface coupled to the memory, the user interface being operative to add, modify, or delete the device programming instructions stored in the memory;

a remote interface coupled to the plurality of telephone lines and the memory, the remote interface being operative to add, modify, or delete the device programming instructions stored in the memory from a remote location; and

a display coupled to the user interface.

25. The device of claim 24, wherein the user interface includes a keyboard device.

26. The device of claim 24, wherein the user interface includes a touch screen device.

27. The device of claim 24, wherein the user interface includes a voice activated device.

28. The device of claim 24, wherein the display includes a liquid crystal display.

29. The device of claim 1, wherein the telephone set is a wireless telephone set.

30. The device of claim 1, wherein the telephone set is a wireline telephone set.

31. A telephone set for use in a telecommunications network, the equipment comprising:

a caller-ID component coupled to the network, the caller-ID component being operative to extract a call identifier from an incoming call; and

a processor coupled to the caller-ID component, the processor being programmed to assign the incoming call to a caller category based on the call identifier, the caller category being one of a plurality of caller categories, and process the incoming call in accordance with one of a plurality of call processing routines, the processor selecting a call processing routine corresponding to the assigned caller category.

32. The device of claim 31, wherein the telephone set is a wireless telephone set.

33. The device of claim 31, wherein the telephone set is a wireline telephone set.

34. A telephone device for use in a telecommunications network, the telephone device being coupled to the

telecommunications network by a plurality of telephone lines, the telephone device comprising:

a database component having stored therein a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories;

a caller-ID circuit operative to extract a call identifier from an incoming call propagating on a first telephone line of the plurality of telephone lines;

a call processing circuit coupled to the caller-ID circuit and the database, the call processing circuit being operative to associate the incoming call to a caller category based on the call identifier association in the database, to select a call processing action corresponding to the caller category, and to process the incoming call in accordance with the selected call processing action; and

a call forwarding circuit coupled to the call processing circuit, the call forwarding circuit being operative to forward the incoming call to a predetermined telephone number over the second telephone line when the call identifier is associated with a predetermined caller category.

35. The device of claim 34, wherein the predetermined caller category is an important call category.

36. The device of claim 34, wherein the plurality of calling categories includes an important call category, a regular call category, and an undesirable call category.

37. The device of claim 36, wherein the device sounds a first distinctive ringing tone when the call identifier of the incoming call is associated with the important call category, the first distinctive ringing tone being retrieved from a library of ringing tones in the database.

38. The device of claim 34, wherein an e-mail message is transmitted to a predetermined e-mail address via a computer interface when a connection is not established with a party at the predetermined telephone number.

39. The device of claim 34, wherein a pager message is transmitted to a predetermined paging address when a connection is not established with a party at the predetermined telephone number.

40. The device of claim 34, wherein the incoming call is forwarded to the voice mail component when a connection is not

established with a party at the predetermined telephone number.

41. The device of claim 34, wherein the database further comprises:

a first database having stored therein the plurality of caller identifiers;

a second database including a library of ringing tones, each ringing tone being associated with one calling category of the plurality of calling categories; and

a third database including a record log for storing at least one call characteristic of at least one telephone call established between the telephone set and a remote destination telephone set.

42. The device of claim 41, wherein the call processor stores the at least one call characteristic for each incoming call in the record log.

43. The device of claim 42, wherein the at least one call characteristic includes a telephone number, a date of the incoming call, a time of the incoming call, and the category of the incoming call.

44. The device of claim 43, wherein the call processor stores the at least one call characteristic for each incoming call in the record log for at least thirty days.

45. The device of claim 41, wherein the call processor stores the at least one call characteristic for each outgoing call in the record log.

46. The device of claim 41, wherein the at least one call characteristic includes a called party identifier, a date of the outgoing call, a time of the outgoing call, and a duration of the outgoing call.

47. The device of claim 34, wherein the telephone set is a wireless telephone set.

48. The device of claim 34, wherein the telephone set is a wireline telephone set.

49. A telephone device for use in a telecommunications network, the telephone device being coupled to the telecommunications network by a plurality of telephone lines, the telephone device comprising:

a database having stored therein data, the data including a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories;

a caller-ID circuit operative to extract a call identifier from an incoming call propagating on one of the plurality of telephone lines;

a call processing circuit coupled to the caller-ID circuit and the database, the call processing circuit being operative to associate the incoming call to a caller category based on the call identifier association in the database, to select a call processing action corresponding to the caller category; and to process the incoming call in accordance with the selected call processing action; and

a data entry component coupled to the database, the data entry component being operative to add data to the database, modify data in the database, or delete data from the database.

50. A method for processing an incoming telephone call using a telephone set, the telephone set being coupled to a telecommunications network by a plurality of telephone lines, the method comprising:

extracting a call identifier from the incoming call

propagating on a first telephone line of the plurality of telephone lines;

assigning the incoming call to a caller category based on the call identifier;

selecting a call processing action corresponding to the caller category; and

processing the incoming call in accordance with the selected call processing action.

51. The method of claim 50, wherein the plurality of calling categories includes an important call category, a regular call category, and an undesirable call category.

52. The method of claim 51, wherein the step of processing includes forwarding the incoming call to a predetermined location over a second telephone line when the call identifier is associated with the important call category.

53. The method of claim 52, wherein the step of processing includes transmitting an e-mail message to a predetermined e-mail address when a connection is not established with the predetermined location.

54. The method of claim 52, wherein the step of processing includes transmitting a pager message to a predetermined paging address when a connection is not established with the predetermined location.

55. The method of claim 52, wherein the step of processing includes forwarding the incoming call to voice mail when a connection is not established with the predetermined location.

56. The method of claim 51, wherein the step of processing includes setting the regular call category as a default category, such that an incoming call having a call identifier not stored in the telephone set is processed as a regular call.

57. The method of claim 51, wherein the step of processing includes forwarding the incoming call to voice mail when the call identifier is associated with the regular call category.

58. The method of claim 51, wherein the step of

processing includes disconnecting the incoming call when the call identifier of the incoming call is associated with the undesirable call category.

59. The method of claim 58, wherein the step of processing a call in the undesirable call category includes transmitting a pre-recorded message to a calling party before disconnecting the incoming call.

60. The method of claim 51, wherein the step of processing includes generating a first distinctive ringing tone when the call identifier of the incoming call is associated with the important call category.

61. The method of claim 51, wherein the step of processing includes generating a second distinctive ringing tone when the call identifier of the incoming call is associated with the regular call category.

62. The method of claim 51, wherein the step of processing includes generating a third distinctive ringing tone when the call identifier of the incoming call is associated with the undesirable call category.

63. The method of claim 51, wherein the step of processing includes generating a fourth distinctive ringing tone when the telephone set and a computer are coupled to a telephone line of the plurality of telephone lines, and the computer is connected to the internet.

64. The method of claim 50, wherein the step of assigning includes providing a database having stored therein data, the data including a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories.

65. The method of claim 64, wherein the step of assigning includes adding, modifying, or deleting data from the database.

66. The method of claim 65, wherein the steps of adding, modifying, or deleting data from the database are performed at a location remote from the telephone set.

67. In a telephone set having a database, an instruction set, and a graphical user interface including a display and a

data entry device, a method of providing and selecting from a menu on the display, the method comprising:

retrieving a set of menu entries from the menu;

displaying the menu entries on the display, each menu entry representing a programmable operation;

selecting one menu entry from the set of menu entries on the display using the data entry device;

performing the programmable operation represented by the selected menu entry; and

transmitting a signal from the telephone set, the signal being indicative of the selected menu entry.

68. The method of claim 66, wherein the step of performing includes searching the database.

69. The method of claim 66, wherein the step of performing includes adding to the database, modifying the database, or deleting at least a portion of the database.

70. The method of claim 66, wherein the step of performing includes adding to the instruction set, modifying the instruction set, or deleting at least a portion of the instruction set.

71. The method of claim 66, wherein the database further comprises:

a first portion having stored therein a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories;

a second portion including a library of ringing tones, each ringing tone being associated with one calling category of the plurality of calling categories; and

a third portion including a record log for storing at least one call characteristic of at least one telephone call established between the telephone set and a remote destination telephone set.

72. The method of claim 70, wherein the plurality of calling categories includes an important call category, a regular call category, and an undesirable call category.

73. The method of claim 70, wherein the at least one call characteristic includes a telephone number, a date of the incoming call, a time of the incoming call, and the category of the incoming call.

74. The method of claim 72, wherein the telephone set is operative to store the at least one call characteristic for each incoming call in the record log for at least thirty days.

75. The method of claim 72, wherein the step of performing includes storing the at least one call characteristic for each outgoing call in the record log.

76. The method of claim 74, wherein the at least one call characteristic includes a called party identifier, a date of the outgoing call, a time of the outgoing call, and a duration of the outgoing call.

77. The method of claim 70, wherein the step of performing includes adding, modifying or deleting at least one of the plurality of caller identifiers.

78. The method of claim 76, wherein the at least one of the plurality of caller identifiers includes a telephone number, a party name, a party affiliation, or an address.

79. The method of claim 66, wherein the step of

transmitting includes emitting an audible signal.

80. The method of claim 66, wherein the step of transmitting includes displaying the signal on the display.

81. The method of claim 66, wherein the steps of retrieving and selecting are performed by voice command, keyboard entry, mouse, touch screen, or via personal computer.

82. A computer readable medium having stored thereon a database comprising:

a first portion having stored therein a plurality of caller identifiers, each caller identifier being associated with one calling category of a plurality of calling categories;

a second portion including a library of ringing tones, each ringing tone being associated with one calling category of the plurality of calling categories; and

a third portion including a record log for storing at least one call characteristic of at least one telephone call established between the telephone set and a remote destination telephone set.

83. A computer readable medium having stored thereon a data structure comprising:

an incoming caller identifier;

a date of an incoming call;

a time of the incoming call; and

a caller category.

84. The computer readable medium of claim 76, wherein the caller category includes an important call category, a regular call category, and an undesirable call category.

85. The computer readable medium of claim 76, wherein the caller identifier includes a telephone number, a party name, a party affiliation, an address, or miscellaneous data.

86. A computer readable medium having stored thereon a data structure comprising:

a calling party identifier;

a date of an outgoing call;

a time of the outgoing call;

a caller category; and

a duration of the outgoing call.

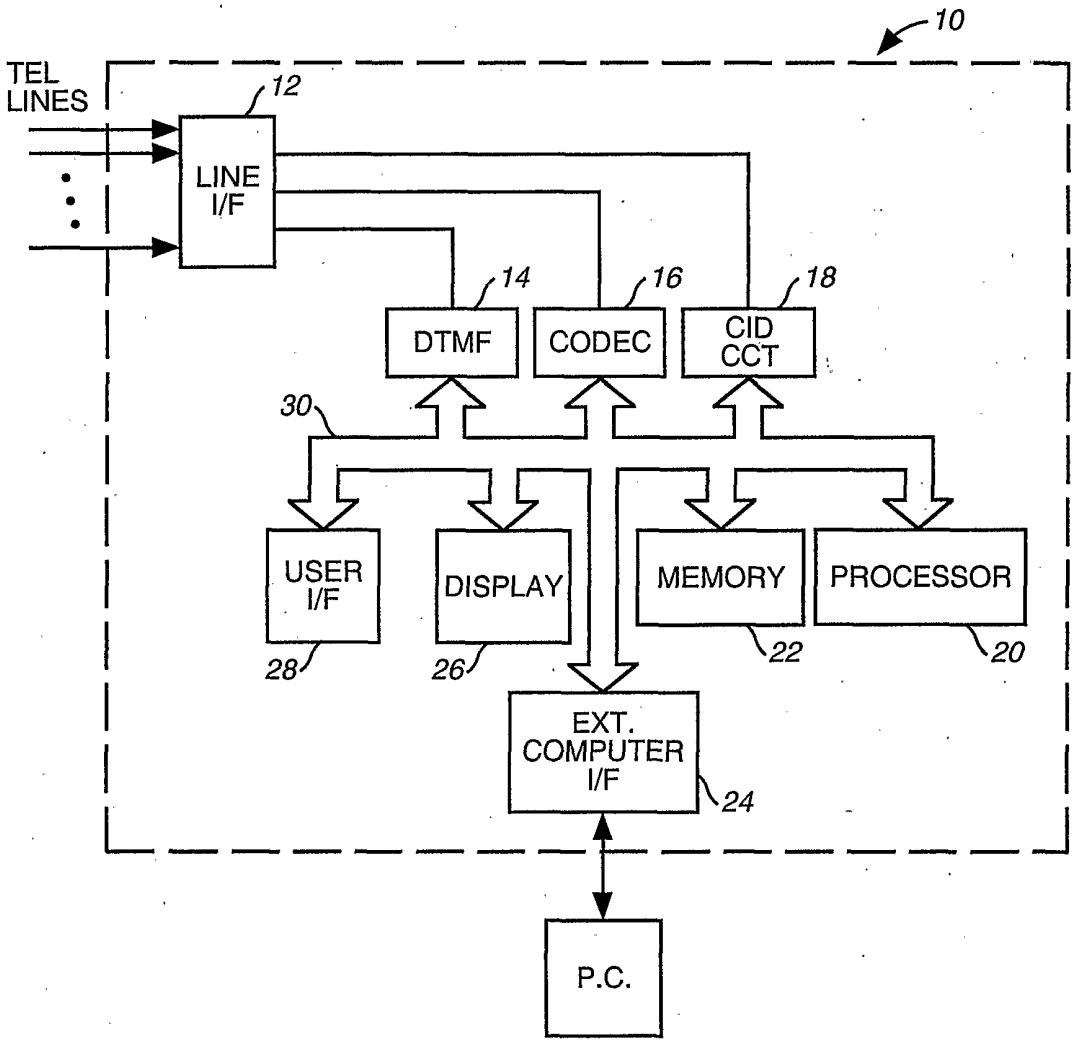
10
TEL LINES
12
LINE I/F
14
DTMF
16
CODEC
18
CID CCT
30
USER I/F
28
DISPLAY
26
MEMORY
22
PROCESSOR
20
EXT. COMPUTER I/F
24
P.C.

FIG. 1

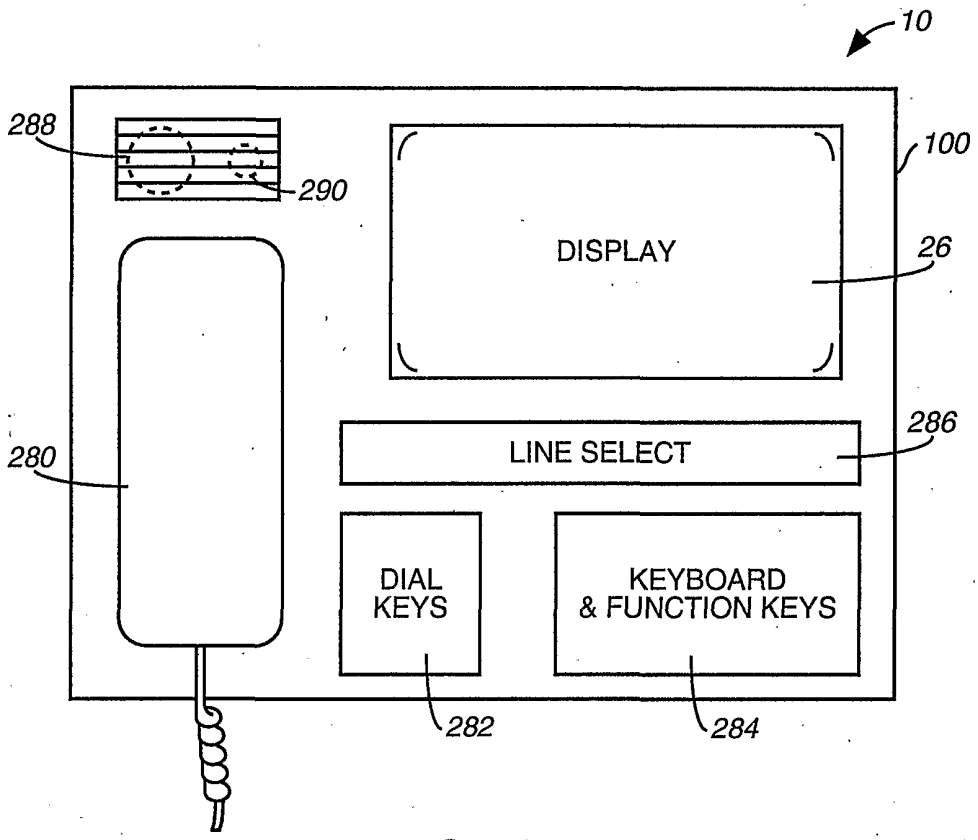
10
288
290
100
DISPLAY
26
280
LINE SELECT
286
DIAL KEYS
KEYBOARD & FUNCTION KEYS
282
284

FIG. 2A

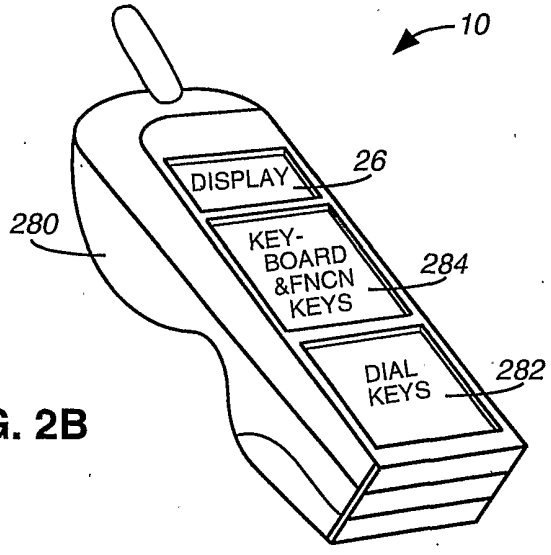
10
DISPLAY
26
280
KEY-BOARD &FNCN KEYS
284
DIAL KEYS
282

FIG. 2B

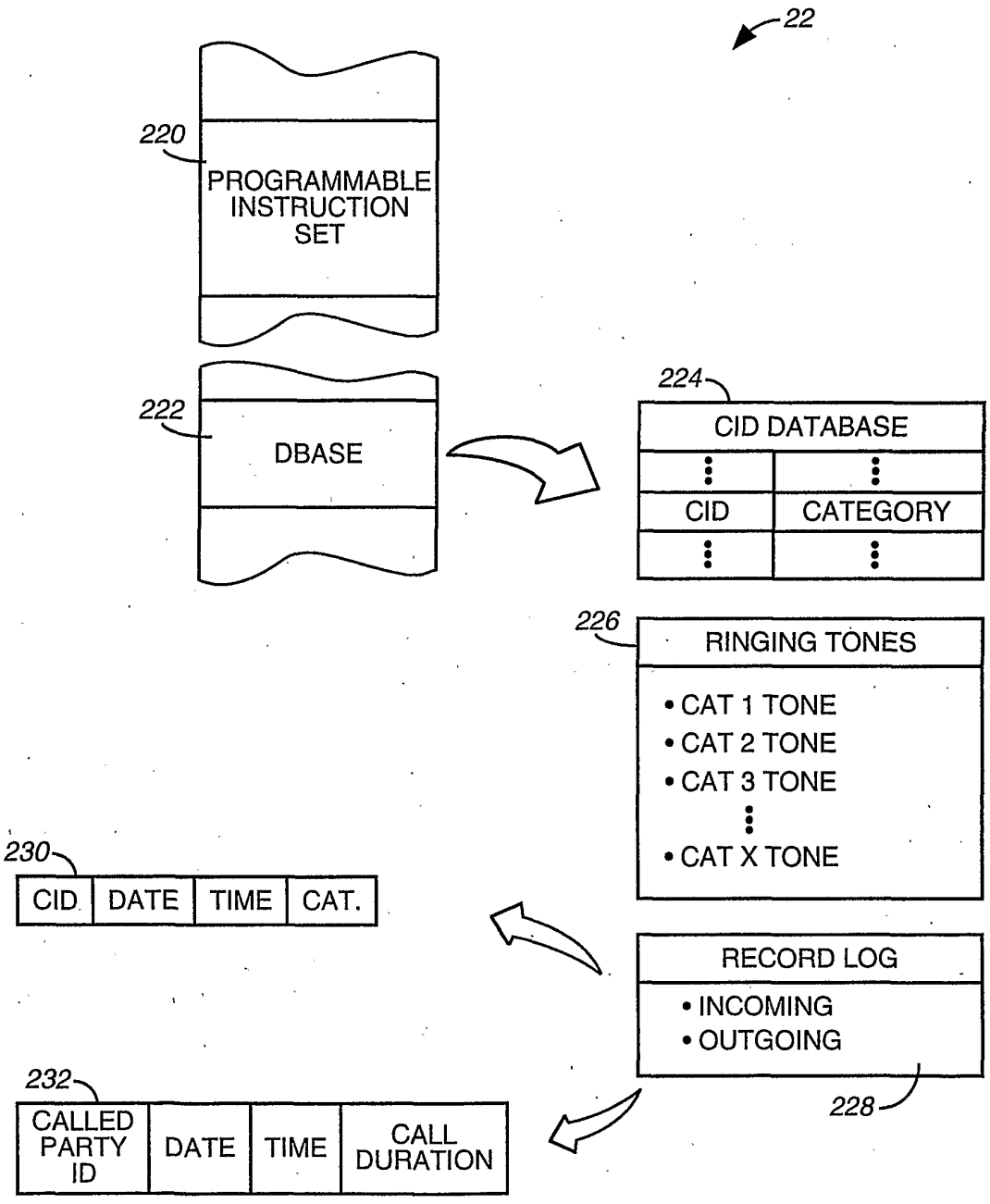
22
220
PROGRAMMABLE INSTRUCTION SET
222
DBASE
224
CID DATABASE
CID
CATEGORY
226
RINGING TONES
• CAT 1 TONE
• CAT 2 TONE
• CAT 3 TONE
• CAT X TONE
230
CID
DATE
TIME
CAT.
RECORD LOG
• INCOMING
• OUTGOING
228
232
CALLED PARTY ID
DATE
TIME
CALL DURATION

FIG. 3

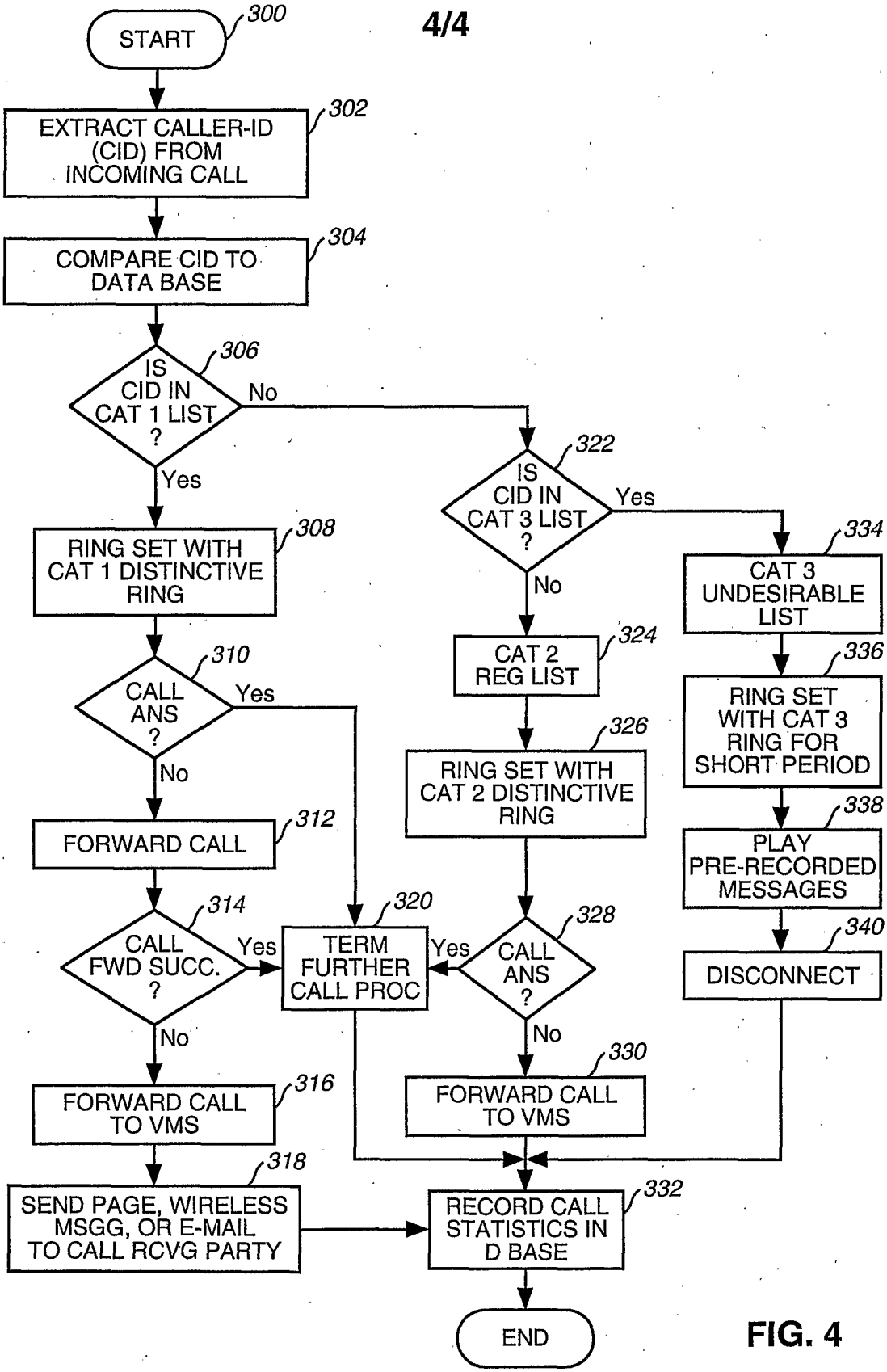
START
300
EXTRACT CALLER-ID (CID) FROM INCOMING CALL
302
COMPARE CID TO DATA BASE
304
IS CID IN CAT 1 LIST ?
306
No
Yes
RING SET WITH CAT 1 DISTINCTIVE RING
308
CALL ANS ?
310
Yes
No
FORWARD CALL
312
CALL FWD SUCC. ?
314
Yes
No
FORWARD CALL TO VMS
316
SEND PAGE, WIRELESS MSGG, OR E-MAIL TO CALL RCVG PARTY
318
TERM FURTHER CALL PROC
320
IS CID IN CAT 3 LIST ?
322
Yes
No
CAT 2 REG LIST
324
RING SET WITH CAT 2 DISTINCTIVE RING
326
CALL ANS ?
328
Yes
No
FORWARD CALL TO VMS
330
CAT 3 UNDESIRABLE LIST
334
RING SET WITH CAT 3 RING FOR SHORT PERIOD
336
PLAY PRE-RECORDED MESSAGES
338
DISCONNECT
340
RECORD CALL STATISTICS IN D BASE
332
END

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/10275

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :H04M 1/56, 3/00

US CL :Please See Extra Sheet.

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. : 379/142.01, 142.03, 142.04, 142.06, 142.07, 142.17, 211.02, 373.01, 373.02, 374.01, 374.02; 455/414, 415

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	US 5,473,671 A (PATRIDGE, III) 05 DECEMBER 1995, SEE ENTIRE DISCLOSURE	1, 3-7, 12-33, AND 49-86
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Y		2, 8-11 AND 34-48
X	US 5,559,860 A (MIZIKOVSKY) 24 SEPTEMBER 1996, SEE ENTIRE DISCLOSURE.	1, 3-7, 12-33 AND 49-86
---		---
Y		2, 8-11 AND 34-48
Y	US 4,942,598 A (DAVIS) 17 JULY 1990, SEE ENTIRE DISCLOSURE	2, 8-11 AND 34-48

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

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 21 MAY 2002	Date of mailing of the international search report 08 JUL 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer REXFORD BARNIE Telephone No. (703) 306-2744

Form PCT/ISA/210 (second sheet) (July 1998)★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/10275

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

379/142.01, 142.03, 142.04, 142.06, 142.07, 142.17, 211.02, 373.01, 373.02, 374.01, 374.02; 455/414, 415