

CALLER ID BLOCKING METHOD AND DEVICE IN CALLING
PARTY TELEPHONE NUMBER DISPLAYING SYSTEM

Technical Field

5 This invention relates to a caller ID blocking method and device in a calling party telephone number displaying system.

Background Art

10 A caller ID telephone service system was developed in New Jersey, U.S.A. and was very successful. This system is fundamentally covered by U.S. Patent No. Re.31789 (Hashimoto Patent) and U.S. Patent 4,551,581 (Doughty Patent).

15 But in this system, the calling party's telephone number shall be displayed in the called party side in force, even if the calling party does not want to be displayed in the called party's device. However, if an official or private searching organization wants to search a subscriber's personal matter, this system sometimes gives the subscriber a bad feeling or a
20 rejected feeling when he looks at the calling party's telephone number. So, in some case, according to the will of the calling party, there was strong request to the system not to display a calling party's telephone number in the caller ID service area.

25 Summary of the Invention

This invention develops a new method for the

caller ID system which displays the calling party's telephone number on the called party side.

According to one aspect of the present invention, there is provided a method of processing telephone calls in a telephone system having an exchange system between telephone devices of a calling party and the called party, the telephone device of the called party including a telephone set and a receiving device for displaying the caller identification of the calling party, said method comprising the steps of:

providing a specified key number and telephone number information of the called party at the telephone device of the calling party,

connecting the telephone devices of the calling party and the called party together based on the telephone number information, said exchange system blocking from the telephone signal being sent to the telephone device of the called party an identity signal which identifies the caller and is normally sent after a predetermined number of ringing signals, when the exchange system detects the specified key number,

detecting a presence or absence of said identity signal during an on-hook line condition after said predetermined number of ringing signals, and displaying the caller identification of the calling

party to the called party only in response to the presence of said identity signal, and, if an absence of said identity signal is detected,

5 disconnecting the telephone set from a telephone line so as to prevent the telephone set of the called party from ringing in response to further ringing signals.

10 According to another aspect of the present invention, there is provided a caller ID device for coupling to a telephone set and to an exchange system via a telephone line, for processing telephone signals from the exchange system of the type which may indicate an optional identity signal which is used for caller identification and is sent to the called party
15 after a predetermined number of ringing signals, said caller ID device comprising:

 means for detecting ringing signals within the telephone signals,

 means for receiving the identity signal,

20 means, coupled to the ringing signal detecting means and receiving means, for detecting the presence or absence of the identity signal during an on-hook line condition after said predetermined number of ringing signals, and

25 means for disconnecting the telephone set from the telephone line if the identity signal detecting

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means detects the absence of the identity signal, so as to stop a ringer of the telephone set from ringing.

According to another aspect of the present invention, there is provided a method for processing telephone calls in a telephone system, the telephone system including telephone sets of a calling party and a called party coupled through an exchange via a telephone line for processing telephone signals, and the exchange system being operable to block an identity signal which is used for caller identification and is normally sent to the called party after a predetermined number of ringing signals in response to a request made by a calling party when the calling party does not want to display the caller identification on the called party side, said method comprising the steps of:

detecting said ringing signals within the telephone signals,

detecting the presence or absence of a caller identity signal during an on-hook line condition after said predetermined number of ringing signals, and

disconnecting the telephone set of the called party from the telephone line if the step of detecting the presence or absence of the identity signal indicates the absence of the identity signal after said predetermined number of ringing signals so as to

stop a ringer of the telephone set of the called party from ringing.

According to another aspect of the present invention, there is provided a system for processing
5 telephone calls comprising:

a first telephone device for use by the calling party and having means for providing a specified key number and telephone number information of the called party,

10 an exchange system coupled to said first telephone device via a telephone line, said exchange system being operable to block from telephone signals being sent to the called party an identity signal, which is normally sent after a predetermined number of
15 ringing signals, when the exchange system detects the specified number, and

a second telephone device for use by the called party coupled to the exchange system via a telephone line, including a telephone set and a receiving device
20 for displaying the caller identification of the calling party, said receiving device comprising:

a display device for outputting the caller identification,

means for detecting a presence or absence of said
25 identity signal during an on-hook line condition after said predetermined number of ringing signals and

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displaying on the display device the caller identification only in response to the presence of said identity signal, and

5 means for disconnecting the telephone set from the telephone line in order to stop the telephone set of the called party from ringing in response to the absence of the identity signal after said predetermined number of ringing signals.

10 Sometimes the calling party does not want to display his telephone number on the called party side. So, if he uses a specified number which was decided between the telephone exchange office and him, the calling party's telephone number does not display at the called party's side. But at that time, when the
15 telephone exchange office calls the called party, the associated telephone set may ring once and, after one ring, the associated telephone set may disengage the connection of telephone line via a contact of a relay which stops the energizing due to the blocking of the
20 telephone number information from the telephone exchange office.

In one embodiment of the present invention, if

someone hears the first ring, he can operate one push button switch to deenergize the relay and close the contact. Thus, he or she can communicate directly with the calling party by picking up the hand set of an associated telephone set. When no person is near the telephone, a telephone call signal continues to come into the telephone line. A TAD, which is connected in parallel to the telephone line, can be activated by a preset number of telephone rings, and then engaged to communicate with the calling party even if nobody is there. Also, it can be operated by pushing a switch at the called party side that can deenergize the relay and connect the telephone set to the telephone line by a contact of the relay. Thus, people can communicate with the calling party side by manual operation at any time.

Brief Description of the Drawings

Fig. 1 is a circuit diagram of the preferred embodiment of the invention, wherein the dotted line is a receiving device;

Fig. 2 shows a waveform and timing chart which indicates a relation between a ringing signal and an FSK signal including telephone number information, where Fig. 2A is in a case without the blocking function, and Fig. 2B is a case with the blocking function;

Fig. 3 is flow chart which indicates operation of this embodiment step by step.

Description of the Preferred Embodiment

5 An embodiment of the present invention will be described in the following in connection with its structure and operations.

10 In Fig. 1, 1 is a telephone set on the caller's side, 2 is a telephone line, 3 is a switch-board of a telephone exchange office at the caller's side, 4 is another telephone line, and 5 is a switch-board at the called party side. So, ringing signals come into a

telephone set 7 at the called party side via switch-boards 3 and 5 according to the dial operation by the caller. If the aforementioned called party is registered in the switch-board 5 as a subscriber of the caller ID (Identity of Caller's telephone number) service, information of the caller's telephone number is transmitted to the receiving device 8 at the called party side via the switch-boards 3 and 5 during a silent interval between the first and second ringing signals. This exchange system has already been put in market in some areas in the U.S.A. The present invention relates to the receiving device at the called party side for such an exchange system.

Numeral 6 refers to a standard telephone answering device. This device is set to activate after three ringing signals come in; however, information of the caller's telephone number is to be transmitted during the first silent interval. Numeral 7 refers to an associated telephone set and 8 is a receiving device for receiving and displaying information of the caller's telephone number. The receiver 8 comprises the following components. Numeral 9 refers to a detecting section of the ringing signal. The detecting section 9 comprises a bridge diode and a capacitor (not shown), and 10 is a light emitting diode which lights while a ringing signal is

applied. 11 is a photo transistor which is turned on by receiving light from the light emitting diode.

Numeral 12 refers to a one-chip microprocessor CPU, containing a RAM for memorizing information of a caller's telephone number, and a ROM in which a program is stored. INT is an interruption terminal.

I-1 - I-4 are input ports. O-1 and O-2 are output ports. The output of the aforementioned photo

transistor is applied to the input port I-1, and the program detects whether or not a ringing signal is

being applied. 13 is an amplification circuit for amplifying an FSK signal which forms information of

the telephone number. The output of the amplifying circuit 13 is input to FSK demodulator 16, for

instance, IC chip XR 2211, after being shaped by a waveform shaper 14. The output of the carrier signal

is applied to the input port I-3 and output of data are applied to the input port I-2. At this moment,

the FSK signal is usually composed of two waves, such as 1200 Hz and 2200 Hz. In the case of 1200 Hz, data

becomes "1". On the other hand, in the case of 2200 Hz, data becomes "0". Therefore, when any one of 1200

Hz and 2200 Hz is applied, output of the aforementioned carrier signal is "1".

Numeral 17 refers to an OR-gate. 18 is a relay circuit with a contact y1-1 and switch H.S.W. which is

connected in series to the telephone set 7, so as to stop the bell ringing of the said telephone set 7 after a first ring unless information of caller's telephone number is transmitted (Fig. 2B). Numeral 19 refers to a display unit for displaying information of a telephone number, and 20 is a display switching button for switching the display by changing the storage region of RAM when information of a plurality of telephone numbers to be displayed is stored in the RAM.

Next, a detailed description of the present invention will be given by reference to the flowchart of Fig. 3.

When a receiving device is turned on (the power switch is not illustrated), in Step 31 of the flowchart shown in Fig. 3, the output ports 0-1 and 0-2 are initialized, and a power control section 15 is connected to output port 0-1 and a relay Y-1 connected to output port 0-2 become "OFF", respectively. In the next Step 32, the program awaits an incoming ring signal. When a ringing signal comes in, the ringing signal is detected by a ringing signal detecting section 9, shown in Fig. 1, and a photo transistor 11 receives light from light emitting diode 10.

Therefore, an input port I-1 of CPU 12 changes from "H" to "L". When the change from "H" to "L" is

detected in Step 32, Step 32 becomes "YES".

Then, in the next Step 33, the power switch control section becomes "ON" via the output port 0-1, then power is supplied to the FSK demodulator 16, and
5 the program awaits the FSK signal including information of the telephone number to be sent later. In the next Step 34, a silent interval (shown as t1-t4 in Fig. 2A) between the 1st ringing and 2nd ring signals is detected.

10 In Step 35, the carrier signal (t2-t3 in Fig. 2A) of the FSK signal is detected during the period of the silent interval. When a caller is a general subscriber without a blocking key number, the FSK signal including information of the telephone number
15 is transmitted normally. Therefore, Step 35 becomes "YES" and Step 36 follows. In Step 36, the information of the caller's telephone number is transmitted as a series signal, as in the case of well-known data transmission. Therefore, the
20 information is read out at a predetermined timing and stored into the RAM of the CPU in a predetermined order. Simultaneously, information of the caller's telephone number can be displayed on the display unit 19. In the next Step 37, a test is performed to check
25 whether or not all the transmitted information of the caller's telephone number has been completely read

out. After reading out all the information, Step 37 becomes "YES" and then Step 38 follows.

Step 38 becomes "YES" when the next ringing signal is detected, and then the flowchart moves to Step 41. Steps 41 to 43 comprise a loop. A timer of 4.5 seconds (a silent interval between ringing signals of four seconds in USA, therefore, a longer period is set) in Step 42, which is within the aforementioned loop circuit, is used for confirming if the second ringing signal is coming successively after the first ringing signal. When the TAD starts operation after detecting three ringing signals (t7 in Fig. 2A), no more ringing signal is transmitted from the switch-board 5. Therefore, Step 43 becomes "NO" and the flowchart returns to the aforementioned Step 31.

If a caller is registered at the central office managing the switch-board 3 for receiving a service of blocking transmission of information of the caller's telephone number, the caller is given a key number, for instance "#1234", which enables him to block transmission of information of the telephone number. If the caller dials the key number prior to dialling the telephone number of a called party, the key number is recognized by the switch-board 3 and therefore information of the caller's telephone number is not transmitted to the called party (t10-t11 in Fig. 2B).

Therefore, in the case stated above, a carrier signal is not detected during the period of silent interval (t_{10} - t_{11}) between ringing signals. Therefore, Step 35 becomes "NO" and the flowchart moves to Step 39. When the leading edge of the second ringing signal is detected, Step 40 follows, the relay Y-1 connected to output port 0-2 becomes "ON" and the contact y1-1 is broken to disconnect the telephone set 7 from the line. The bell of the telephone set 7 rings only one time and information of the caller's telephone number is not sent to the receiver. Therefore, information of the caller's telephone number is not displayed on the display unit 19.

However, as ringing signals continuously come in through the telephone line, the TAD, directly connected to the telephone line, initiates operation after the bell rings three times. The outgoing message is transmitted and the incoming message of the caller is recorded on the TAD. When the TAD operates, the telephone lines are engaged and no more ringing signal is transmitted from the central office thereafter. Thereafter, the flowchart returns to Step 31 via the aforementioned Step 41 to 43. In Step 31, the relay Y-1 stated above is disengaged. When the relay Y-1 is restored at t_{15} in Fig. 2B, the telephone set 7 is connected to the telephone line. Therefore,

if the telephone set 7 is set off-hook, a conversation can be held with the caller.

As stated above, owing to the invention, if the blocking operation is not actuated, the telephone number of the calling party is displayed, whereas if the blocking operation is actuated, the telephone number of the calling party is not displayed. Moreover, the present invention provides means to enable to stop ringing successively after the bell of a telephone set rings once and to detect a ringing signal by a telephone answering device even though the bell of the telephone set does not ring.

Consequently, the present invention has great advantages for protecting the privacy of calling party in Caller ID network.

CLAIMS

1. A method of processing telephone calls in a telephone system having an exchange system between telephone devices of a calling party and the called party, the telephone device of the called party including a telephone set and a receiving device for displaying the caller identification of the calling party, said method comprising the steps of:

providing a specified key number and telephone number information of the called party at the telephone device of the calling party,

connecting the telephone devices of the calling party and the called party together based on the telephone number information, said exchange system blocking from the telephone signal being sent to the telephone device of the called party an identity signal which identifies the caller and is normally sent after a predetermined number of ringing signals, when the exchange system detects the specified key number,

detecting a presence or absence of said identity signal during an on-hook line condition after said predetermined number of ringing signals, and displaying the caller identification of the calling party to the called party only in response to the



presence of said identity signal, and, if an absence of said identity signal is detected,

disconnecting the telephone set from a telephone line so as to prevent the telephone set of the called party from ringing in response to further ringing signals.

2. A method according to claim 1, further comprising the step of reconnecting the telephone set to the telephone line so that the calling party and the called party can converse with each other.

3. A method according to claim 1 or claim 2, further comprising the step of initiating an operation of a telephone answering device of the called party coupled to the telephone line for recording an incoming message of the calling party after the telephone answering device detects a preset number of ringing signals within the telephone signal.

4. A method as claimed in any preceding claim, wherein the identity signal is an FSK signal provided between first and second ringing signals.

5. A method as claimed in any preceding claim, wherein the telephone set is disconnected from the



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telephone line by energizing a relay.

5 6. A caller ID device for coupling to a telephone set and to an exchange system via a telephone line, for processing telephone signals from the exchange system of the type which may include an optional identity signal which is used for caller identification and is sent to the called party after a predetermined number of ringing signals, said caller ID device comprising:

10 means for detecting ringing signals within the telephone signals,

 means for receiving the identity signal,

 means, coupled to the ringing signal detecting means and receiving means, for detecting the presence or absence of the identity signal during an on-hook line condition after said predetermined number of ringing signals, and

15 means for disconnecting the telephone set from the telephone line if the identity signal detecting means detects the absence of the identity signal, so as to stop a ringer of the telephone set from ringing.

20 7. A device as claimed in claim 6, including means for accepting a further incoming ringing signal through the telephone line, and



means for effecting an off-hook condition on the telephone line of the exchange system to prevent the exchange system from transmitting additional ringing signals after a preset number of ringing signals in order to allow recording of incoming messages of the calling party.

8. A caller ID device according to claim 7 further comprising means for reconnecting the telephone set to the telephone line after the preset number of ringing signals to enable communication between the calling party and the called party.

9. A caller ID device according to any one of claims 6 to 8, wherein said identity signal is an FSK signal and said means for receiving the identity signal comprises:

an amplification circuit coupled to the telephone line,

a waveform shaping circuit coupled to said amplification circuit, and

an FSK demodulator coupled to said waveform shaping circuit and said identity signal detecting means.

10. A caller ID device according to any one of



claims 6 to 9, wherein said ringing signal detecting means comprises:

a diode,

5 a ringing signal detection section coupled to said diode and the telephone line, said ringing signal detection section causing said diode to emit light in response to detection of said ringing signals, and

10 a transistor coupled to said identity signal detecting means and responsive to said light emitted by said diode to indicate to said identity signal detecting means a detection of said first and second ringing signals.

15 11. A caller ID device according to any one of claims 6 to 10, wherein the disconnecting means is operable to energize a relay to disconnect the telephone set.

20 12. A method for processing telephone calls in a telephone system, the telephone system including telephone sets of a calling party and a called party coupled through an exchange via a telephone line for processing telephone signals, and the exchange system being operable to block an identity signal, which is used for caller identification and is normally sent to the called party after a predetermined number of



ringing signals, in response to a request made by a calling party when the calling party does not want to display the caller identification on the called party side, said method comprising the steps of:

5 detecting said ringing signals within the telephone signals,

 detecting the presence or absence of a caller identity signal during an on-hook line condition after said predetermined number of ringing signals, and

10 disconnecting the telephone set of the called party from the telephone line if the step of detecting the presence or absence of the identity signal indicates the absence of the identity signal after said predetermined number of ringing signals so as to
15 stop a ringer of the telephone set of the called party from ringing.

13. A method as claimed in claim 12, further comprising accepting a further incoming ringing signal received over the telephone line in order to enable
20 activation of a telephone answering device after a preset number of ringing signals, and

 effecting an off-hook condition on the telephone line to prevent the exchange system from transmitting additional ringing signals after a preset number of
25 ringing signals in order to allow recording of



incoming messages of the calling party to be made by a telephone answering device.

14. A method according to claim 13, further comprising the step of:

5 reconnecting the telephone set to the telephone line after the preset number of ringing signals, to enable communication between the calling party and called party.

10 15. A method according to any of claims 12 to 14, wherein said identity signal is an FSK signal provided between first and second ringing signals.

16. A system for processing telephone calls comprising:

15 a first telephone device for use by the calling party and having means for providing a specified key number and telephone number information of the called party,

20 an exchange system coupled to said first telephone device via a telephone line, said exchange system being operable to block from telephone signals being sent to the called party an identity signal, which is normally sent after a predetermined number of ringing signals, when the exchange system detects the



specified number, and

a second telephone device for use by the called party coupled to the exchange system via a telephone line, including a telephone set and a receiving device for displaying the caller identification of the calling party, said receiving device comprising:

a display device for outputting the caller identification,

means for detecting a presence or absence of said identity signal during an on-hook line condition after said predetermined number of ringing signals and displaying on the display device the caller identification only in response to the presence of said identity signal, and

means for disconnecting the telephone set from the telephone line in order to stop the telephone set of the called party from ringing, in response to the absence of the identity signal after said predetermined number of ringing signals.

17. A system according to claim 16, wherein said receiving device further comprises means for reconnecting the telephone set to the telephone line so that the calling party and the called party can communicate with each other.



18. A system according to claim 16 or 17,
wherein said second telephone device includes a
telephone answering device for recording an incoming
message after the telephone answering device detects
a preset number of ringing signals.

19. A system as claimed in any one of claims 16
to 18, including a relay coupled between the telephone
set and the telephone line, said disconnecting means
being operable to energize the relay to disconnect the
telephone set.

20. A system as claimed in any one of claims 16
to 19, wherein said identity signal is an FSK signal
provided between first and second ringing signals.

21. Apparatus substantially as herein described
with reference to the accompanying drawings.

22. A method substantially as herein described
with reference to the accompanying drawings.