Claim 1

A communication line control device comprises:

1. A LINE CONTROL unit, which controls the communication line.
2. A LINE DETECT unit, which detects the presence of a line.
3. A PSTU (Power Supply Unit) for providing power to other units.
4. A MICROCONTROLLER unit for managing the operation of the device.
5. A DISPLAY unit for displaying information.
6. A KEYPAD unit for user input.
7. An ESSENTIAL unit for essential functions.
8. A TIMER unit for timing purposes.
9. A 12V DC IN for connecting to a power source.
10. A LINE IN for receiving input from the line.

The LINE CONTROL unit is connected to the LINE DETECT unit, the PSTU unit, and the MICROCONTROLLER unit. The LINE DETECT unit is connected to the PSTU unit and the MICROCONTROLLER unit. The MICROCONTROLLER unit is connected to the DISPLAY unit, the KEYPAD unit, the ESSENTIAL unit, the TIMER unit, the 12V DC IN, and the LINE IN.
COMMUNICATION LINE CONTROL DEVICE

FIELD OF THE INVENTION

This invention relates to a communication line control device and more particularly, but not exclusively, to a communication line control device to control the use of a telephone line.

BACKGROUND TO THE INVENTION

The use of fixed-line telephones can be controlled in a number of ways.

Some fixed-line telephones include mechanical locks to prevent the unauthorised use thereof.

Where fixed line telephones are connected to a switchboard or central exchange, the use of such telephones can be controlled from such a switchboard or exchange. For example, the telephones can be barred from dialling certain numbers such as international telephone numbers.

It is known that mobile telephones can also be barred from dialling certain numbers. Mobile telephones can also be barred altogether in that a pin must be entered into the telephone to authorise the use thereof.
The above methods of preventing the unauthorised use or controlling the use of telephones do not always provide the necessary level of control to the owner or designated user of a telephone. The telephones are either barred from dialling certain telephone numbers or are locked or disabled to prevent any use thereof at all. A higher level of control is often necessary especially where a number of persons use one telephone or where a telephone line is used for other purposes such as to gain access to the Internet or where a telephone line or telephone is available for use without supervision and control of the use of a telephone is required.

OBJECT OF THE INVENTION

It is an object of this invention to provide a communication line control device which, at least partially, alleviates some of the abovementioned difficulties.

SUMMARY OF THE INVENTION

In accordance with this invention there is provided a communication line control device comprising an electronic circuit including a communication line controller for selectively enabling or disabling the use of a communication line; an input means for receiving input instructions relating to the limitations of use by a user of the communication line; and a computing means for controlling the communication line controller in accordance with the input instructions.
A further feature of the invention provides for the communication line controller to be a switch such as a relay switch.

There is provided for the electronic circuit to further include a display; a memory means; a real-time clock and a power supply regulator.

A yet further feature of the invention provides for the display to be liquid crystal ("LCD") display.

There is also provided for the electronic circuit to include a line detection means to include a monitoring means for monitoring the use of a communication line.

A yet further feature of the invention provides for the input means to be a dual-tone-multi-frequency ("DTMF") detection means for monitoring and/or receiving DTMF signals transmitted over the line. Alternatively, for the input means to be a pulse detection means.

There is further provided for the computing means to be a microprocessor including the memory means.

Alternatively, the memory means is a separate memory means such as an electronically erasable programmable memory ("EEPROM").
Further features of the invention provide for the microprocessor to control use of the communication line in accordance with instructions received as a DTMF signal from the communication line via the DTMF detection means.

There is provided for an instruction signal to the microprocessor to be authorised by at least one master personal identification number ("PIN") transmitted as a DTMF signal.

A yet further feature of the invention provides for the electronic circuit to be housed in a separate housing; alternatively, to be housed in a housing of another communication device.

There is provided for the electronic circuit to include a tampered detection facility.

These and other features of the invention are described in more detail below.

**BRIEF DESCRIPTION OF THE DRAWINGS**

A preferred embodiment of the invention is described below, by way of example only, and with reference to the accompanying drawings in which:

Figure 1 shows a schematic block diagram of communication line control device;
Figure 2 shows the communication line control device of figure 1 connected in a first telephone network; and

Figure 3 shows the communication line control device of figures 1 and 2 connected in a second telephone network.

DETAILED DESCRIPTION OF THE DRAWINGS

With reference to the drawings, in which like features are indicated by like numerals, a communication line control device is generally indicated by reference numeral 1.

The communication line control device 1 consists of an electronic circuit 2 including a communication line controller 3 having a relay switch, a line monitoring means 4a, an input means in the form of DTMF sensor 4b, a computing means in the form of a micro-controller or microprocessor 5, a display in the form of a LCD display 6, a memory means in the form of an EEPROM 7, a real time clock 8 and a power supply regulator 9.

The input means can also be a computer 12 or a phone 11 to which the communication line control device is connected or a keypad 17 on the communication line control device.
The communication line control device is housed in a separate housing as shown in figures 2 and 3. It will be appreciated by those skilled in the art that the electronic circuit 2 of the communication line control device 1 can be housed in the housing of another communication device such as a telephone, a modem, a telephone exchange or a computer.

The line monitoring means 4a is used for detecting use of the line 10 and telephone numbers dialled over the line from a computer 12 or telephone 11. The line detection means also includes a DTMF detection means 4b for reading and receiving DTMF signals transmitted over the communication line 10. The monitoring means 4a and the DTMF detection means 4b are connected in parallel to the communication line 10.

The communication line controller 3 includes a switch for selectively enabling or disabling use of the communication line 10. The communication line controller 3 is connected in series with the communication line 10 to split the communication line 10 in “line in” and “line out” sections.

The micro-controller 5 is connected to and controls, and/or receives inputs from, the monitoring means 4a, the DTMF detection means 4b, the display 6, the real-time clock 8, the keypad 17 and the memory means 7.

The power supply regulator 9 supplies power to the communication line controller 3, monitoring means 4a, the DTMF detection means 4b, the display 6,
the keypad 17, the real-time clock 8, the micro-controller 5 and the memory means 7.

It will be appreciate by those skilled in the art that the memory means 7 may be included with the microprocessor 5 or may be a separate unit as shown in figure 1. The micro-controller 5 may also include its own real-time clock or a separate real-time clock 8 may be provided as shown in figure 1.

In use, a master personal identification number ("PIN") is transmitted over the communication line 10 as a DTMF signal by a master user. This is done by the master user dialling a telephone number to activate the communication line 10 and entering his/her pin on a keypad of the telephone used or on a keyboard of a computer being used. The DTMF signal is detected by the DTMF detection means 4b and relayed to the micro-controller 5. After authorisation of the master pin, DTMF instruction signals can be transmitted by the master user to the micro-controller 5 as DTMF signals. The use of the master pin authorises instructions sent by the master user, as DTMF signals, to the micro-controller 5. The instructions given by the master user determines the limited or unlimited usage of the communication line 10 by other users thereof as is further explained below. No Instructions can be given or altered without using the master pin.

The master user can alternatively use the computer 12 of telephone 11 to which the communication line control device is connected to enter his/her pin and
instructions. Further alternatively, a keypad may be provided on the communication line control device 1 on which the master user can enter his/her pin and usage instructions.

Prior to using a telephone 11 or a modem of a computer 12, a pin number must be provided by users, including the master user. A number of users each have their own pin numbers. It is envisaged that the communication line control device can control the use of six users. It will be appreciated that any number of users could be controlled without departing from the scope of this invention.

Each user, by using its pin, will gain limited or unlimited access to the communication line 10 as determined by the instructions programmed into the communication line control device 2 by the master user.

When the telephone receiver of the telephone 11 is lifted, or when the modem of the computer 12 is activated, a user is prompted by the communication line control device 1 to enter their pin number. Software programs are used to ask for a pin before a browser is activated in the case of using the computer 12. A pin number is entered on the keyboard of the computer 12 or on the keypad of the telephone 11. If the pin number entered is correct and the user has authorised time remaining or the user is allowed to make calls at that specific time of day, or the user is allowed to make calls to predetermined telephone numbers, the user is prompted to dial the required number. The number dialled by the user is monitored and if that specific number is barred, the user will not be
allowed to make that call and the communication line controller 3 will disable the communication line 10 to prevent the call from being made.

If a user enters an incorrect pin number on the telephone 11 or modem of the computer 12, he will be prevented from making any calls until the correct pin number is entered. If a user has no call time remaining he may be allowed to dial only free telephone numbers such as emergency numbers.

The master pin can be used to enter all limitations in respect of users and to add new users, to delete a user, to modify limitations of users, to change the master pin itself, to free and bar certain telephone numbers or to lock the communication line 10 altogether. The user can set limitations such as total or specific call times, time of day limitation, generic number barring or specific number barring. When a user is using the telephone 11 or computer 12 the user is limited to a certain call duration or if his total authorised time is running out, a buzzer (not shown) will sound at certain intervals prior to the expiry of the available time.

The electronic circuit 2 is powered from mains power supply using a transformer to provide 12 volt direct current. The electronic circuit 2 also includes a backup rechargeable battery (not shown) in case of power failures.

The DTMF detection means 4b detects the master pin number transmitted over the communication line. This master pin number and instructions associated
therewith does not have to be transmitted from the telephone 11 or computer 12. The master pin number and instructions can be transmitted from an outside telephone 15 over a telephone network 16. The master pin number and associated instructions can also be transmitted from a cell phone or other mobile phone 13 over any telephone network 16. The master pin number and instructions may even be transmitted from an outside computer 14 over the Internet to the communication line control device 1.

An interactive voice response ("IVR") facility may also be included with the communication line control device for use by users including the user of the master pin.

The electronic circuit 2 also includes a tamper detector (not shown) to record the time of day and length of time that the communication line control device 1 is or was disconnected from the communication line 10. Once the communication line control device 1 is disconnected from the communication line 10 the microprocessor will allow only free numbers or any other number as determined by the user of the master pin. The communication line control device 1 will only be unlocked or enabled by entering the master pin after disconnection from the communication line.

It is envisaged that the communication line control device described herein will provide control over time spent accessing services such as the Internet or making normal telephone calls. Generic number or specific numbers can also
be barred. The time of day accessing such services can also be controlled. The communication line control device described herein is also convenient to use in that instructions can be provided from any remote location and a backup battery is provided in case of power failures. The use of a communication line can thus be controlled on a high level.

Another advantage over conventional barring systems is that specific numbers may be barred instead of only certain generic numbers such as so called "08" numbers. Specific numbers including any number of digits may be barred in this manner.

The invention is not limited to precise details as described herein. For example, communication line control device is not limited for use with telephone lines and/or DTMF signals. The communication line control device can be used with any communication line and with any type of signal modulation used over such a line. The control device can also include its own keypad for inputting PIN's and instructions and for retrieving information from the memory means and displaying information on the LCD display. Instead of using DTMF signals, pulse dialling can be used in which case the DTMF detection means will be replaced with a pulse detection means.

The communication line control device 1 could also be modified to operate with a telephone exchange so that the access and/or use of a number of telephone line extensions can be controlled as described above.
CLAIMS

1. A communication line control device comprising an electronic circuit including a communication line controller for selectively enabling or disabling the use of a communication line; an input means for receiving input instructions relating to the limitations of use by a user of the communication line; and a computing means for controlling the communication line controller in accordance with the input instructions.

2. A communication line control device as claimed in claim 1 in which the communication line controller is a switch.

3. A communication line control device as claimed in claim 2 in which the switch is a relay switch.

4. A communication line control device as claimed in any one of the preceding claims in which the electronic circuit includes a display.

5. A communication line control device as claimed in any one of the preceding claims in which the electronic circuit includes a memory means.
6. A communication line control device as claimed in any one of the preceding claims in which the electronic circuit includes a real-time clock.

7. A communication line control device as claimed in any one of claims 4 to 6 in which the display is a liquid crystal display ("LCD").

8. A communication line control device as claimed in any one of the preceding claims in which the control device includes a monitoring means for monitoring the use of a communication line.

9. A communication line control device as claimed in claim 8 in which the monitoring means is arranged to monitor numbers dialled by a user on the communication line.

10. A communication line control device as claimed in any one of the preceding claims in which the input means includes a dual-tone-multi-frequency ("DTMF") detection means for receiving DTMF instruction signals transmitted over the communication line.

11. A communication line control device as claimed in any one of the preceding claims in which the computing means is a microprocessor.
12. A communication line control device as claimed in any one of claims 1 to 10 in which the memory means is an electronically erasable programmable memory ("EEPROM").

13. A communication line control device as claimed in any one of the claims 10 to 12 in which the microprocessor controls use of the communication line in accordance with instructions received as a DTMF signals from the communication line via the DTMF detection means.

14. A communication line control device as claimed in any one of the preceding claims in which an instruction signal to the microprocessor is authorised by at least one master personal identification number ("PIN") transmitted as a DTMF signal.

15. A communication line control device as claimed in any one of the preceding claims in which the electronic circuit is housed in a stand-alone housing.

16. A communication line control device as claimed in any one of claims 1 to 14 in which the communication line control device is housed in a housing of another communication device.
17. A communication line control device as claimed in any one of the preceding claims in which the electronic circuit includes a tamper detection circuit.

18. A communication line control device as claimed in any one of claims 1 to 9 in which the input means is a keypad connected to the electronic circuit.

19. A communication line control device as claimed in any one of claims 1 to 9 in which the input means is a pulse detection means.

20. A communication line control device as claimed in any one of claims 1 to 9 in which the input means is a personal computer.

21. A communication line control device as claimed in any one of claims 1 to 9 in which the input means is a keypad.

22. A communication line control device as claimed in claim 20 in which the computing means controls use of the communication line in accordance with pulse instruction signals received via the pulse detection means over the communication line.

23. A communication line control device as claimed in claim 20 or 22 in which an instruction signal to the micro-processor is authorised by a master personal identification number transmitted as a pulse signal.
24. A communication line control device substantially as described herein with reference to and as illustrated in the drawings.