(54) Title: METHOD AND APPARATUS FOR DISPLAY OF CALLER ID AND CELLULAR EXTENDED INFORMATION ON A FIXED WIRELESS TERMINAL

(57) Abstract: A type-2, caller-ID terminal is coupled to a fixed wireless terminal consisting of a cellular or cellular-like transceiver and a cellular or cellular-like interface that couples a standard land-line telephone instrument to the cellular or cellular-like transceiver, whereby the caller-identification may be displayed thereby for calls made to and from the fixed wireless terminal, and whereby many other types of useful information may be displayed to the user of the fixed wireless terminal.
Method and Apparatus for Display of Caller ID and Cellular
Extended Information on a Fixed Wireless Terminal

BACKGROUND OF THE INVENTION

This present invention is directed to a method and apparatus for sending data from a fixed wireless terminal (FWT) consisting of a cellular or cellular-type transceiver and a telephone interface to a customer's premise equipment (CPE) suitable for displaying common caller-ID information. The fixed wireless terminal with cellular interface is disclosed in U.S. Patent No. 4,658,096, which patent discloses a cellular or cellular-like interface that couples a standard land-line type of telephone instrument, such as a POTS, to a cellular or cellular-like transceiver, whereby the standard land-line telephone instrument may be used for making and/or receiving calls over a cellular or cellular-like system.

The customer's premise equipment is of the type 2 caller-ID unit, such as that disclosed in British Patent No. GB 2,258,119 B, entitled "Spontaneous Caller Identification with Call Waiting." A type-2 caller-ID unit is normally alerted by a dual tone audio signal while the telephone is in use, and these same conditions exist on the telephone line when the standard telephone handset coupled to the FWT is lifted to access the FWT.

In addition to the common caller-identification information, such as date, time, calling number and caller name, the present invention also provides a means by which to transmit any data available at the FWT to the type-2, caller-ID display unit in a form which can be displayed by it, for use by the user of the FWT.
There are presently used hand-held cellular or cellular-like phones that provide dedicated displays, such as pagers and cellular mobile phones which display caller-identification and messages. Depending upon the type of cellular system, cellular phones may be capable of displaying the telephone number of the calling party, as well as the date and time thereof. A fixed wireless terminal (FWT), also known as a wireless, local-loop terminal, operates with a standard POTS telephone, which, typically, does not have a display. Inexpensive caller-ID terminals, and some display telephones, are available to display caller-identification information sent from a wireline telephone network's central office to the FWT-user premises.

**SUMMARY OF THE INVENTION**

According to the present invention, an inexpensive, Type-2, caller-ID terminal, hitherto used only with landline telephone equipment, is coupled to a fixed wireless terminal, or FWT, consisting of a cellular or cellular-like transceiver, and a cellular or cellular-like interface that couples a standard land-line telephone instrument to the cellular or cellular-like transceiver, whereby caller-identification may be displayed thereby for calls made to and from the FWT, and whereby many other types of useful information may be displayed to the user of the FWT. The kinds of extended information that may be displayed include, but are not limited to:

- messages received by the FWT, such as cell broadcast or short-message service
- FWT operational-status information
- received radio-signal level and other operational information
- information to aid in the setup or maintenance of the FWT at the user-premises
- telephone-tariff information (when available from a cellular network)
• call-timer information, for current call and other periods recorded by the FWT.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more readily understood with reference to the accompanying drawings, wherein:

Figure 1 is a high-level, functional block diagram of the configuration of the present invention, where a cellular-radio transceiver is interfaced to a conventional type-2, caller-ID unit by means of interface circuitry in the FWT of the present invention; and

Figure 2 is a block diagram of the hardware for interfacing a cellular-radio transceiver to a conventional, type-2 call-ID unit for displaying caller-identification and extended information on the caller-ID unit.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings in greater detail, and for now to Fig. 1, there is shown a modified fixed wireless terminal (FWT) 10 which incorporates a conventional, type 2 caller-ID unit 12, which may be used to provide a display of information. The type-2 caller-ID unit may be that disclosed in British Patent No. GB 2,258,119 B, entitled "Spontaneous Caller Identification with Call Waiting." The type-2 CID unit is an extension of and includes all of the functionality of the type-1 CID unit, which type-1 unit is shown in U.S. Patent No. 4,582,956. While for display of just the incoming caller-ID, a type-1 unit may be used, in order to display extended information, as discussed hereinbelow, a type-2 caller ID is necessary. Type-1 caller-ID includes responds to ring signal and its message format is different from a type-2 device.
The modified FWT 10 includes a cellular, or cellular-like, radio transceiver 16, and a cellular, or cellular-like, interface unit 18, as disclosed in U.S. Patent No. 4, 658,096, for coupling a standard, landline-telephone instrument, such as POTS 20, to the cellular, or cellular-like, radio transceiver 16. The interface unit 18, according to the present invention, is modified and includes software for coupling the caller-ID unit 12 to the transceiver 16 and to the telephone instrument 20. The software of the present invention mimics in the FWT 10 the equipment and functions usually associated with the PSTN central office to supply caller-identification information. According to the present invention, the modified interface 18 not only provides caller-identification information, but also provides extended information to the user of the FWT, as is described hereinbelow. The modified FWT apparatus 10 of the invention may be used during a call, or outside a call, depending on what information is to be displayed. When there is no call in progress, the user may lift the telephone handset of the telephone 20, and dial an operation code on the telephone keypad, which the software of the modified FWT interface 18 recognizes, causing the FWT interface 18 to transmit the requested information to the caller-ID unit 12, for display. If a call is in progress, the actions are the same, except that the apparatus mutes the audio to the remote user during the message transmission time. (The Caller ID unit normally mutes the audio to and from the attached telephone during the message transmission.)

Referring now to Fig. 2, the modified FWT interface 18 includes a micro-controller 30, tone generator/detector 32, filter 34, and subscriber line interface circuit (SLIC) 36, which are the same as the FWT interface disclosed in U.S. Patent No. 4, 658,096 for interfacing a POTS telephone to a cellular radio transceiver, in order to provide to the user of a wireless telephone a service that emulates wireline service. According to the present invention, there is also provided in the FWT 10 a modem 40, such as a Bell 202 or ITU (CCITT) V.23, selected for the country of
use, for generating the appropriate signals, under control of the software of the present invention stored in memory of the micro-controller 30, in order to drive the attached caller-ID unit 12. This may be done with separate circuits, or by available tone generator/detector chips with modem tone capabilities, such as, for example, an MX-COM, Inc. CMX-605 Digital Line to POTS Interface chip. Any other conventional component that provides equivalent functions may be used. The Bell 202 modem is an asynchronous device which uses continuous phase Frequency Shift Keying (FSK). A logic 1 (Mark) is sent as a 1200 Hz tone; a logic 0 (Space) is sent as a 2200 Hz tone. The data rate is 1200 bits/second. The nominal signal level is −13.5 dBm.

Information is sent LSB first, most significant character of the message first. Each character is encoded as ten bits; one start bit (space), eight data bits (ASCII character), one stop bit (mark). The information ends with a checksum, which is the two’s complement of the modulo 256 sum of all of the preceding characters. No error correction is used. Note that these parameters are used for Bell 202 modem compatibility in the US; other countries vary somewhat. The variations are easily accommodated by changes to the software that controls the process.

The following detailed functions of the apparatus 10 of the invention are described relative to a typical request for information from the user, such as a request for display of a message received by the cellular radio. The tone frequencies and instruction sequence described herein are for a U.S. application, but they are easily changed under control of a software switch function to the proper values for the country where the apparatus is deployed. The protocol described herein is based on the now-current operation of a type-2, caller-ID unit in the United States. If the protocol is modified in the future, it is the intent of the present invention that the provided protocol may be easily changed by software control of the micro-controller 30;
similarly, changes may be made in protocol for units deployed in other countries where the protocol may be different.

In order to request a display of a message received by the cellular radio transceiver 16, the user lifts the handset of the POTS telephone 20, and dials a pre-defined, DTMF sequence which requests that a type of message be displayed. For example, the following may be used:

`#*6*5#`

where “#*” is a flag which tells the system that a command sequence is coming, “6” indicates that the playback of a stored message is requested, “*” is a delimiter, “5” indicates that the fifth message in the queue is desired, and “#” is the end-of-sequence delimiter.

When the “#*” characters are recognized by the modified interface circuit 18, the audio to and from the cellular radio transceiver 16 is muted, and the cellular transmit data buffer is cleared by a command from the micro-controller 30, so that the characters are not transmitted over the cellular link. The micro-controller 30 decodes the dialed sequence, and requests the fifth stored message from the cellular radio transceiver 16, which then sends it to the micro-controller. The micro-controller formats the message data within a standard type-2 caller-ID message format, and sends it via the modem 40 and/or tone generator/detector chip 32 and SLIC 36 to the caller-ID unit 12.

The message-sending process, based on the standard message of a type-2 caller-ID function, proceeds as follows. The modified interface circuit 18, emulating the POTS central office functions, sends the CPE Alerting Signal (CAS - dual tone burst, 2130 and 2750 Hz, 80 milliseconds long) to “wake up” the caller-ID unit 12. If the caller-ID unit properly decodes the CAS and is ready to receive, it mutes the telephone, and returns an acknowledgement tone
(ACK), such as 60 milliseconds of a conventional DTMF "A" or "D", "D" is most common. When the interface 18 decodes the ACK, it sends a string of 80 mark-bits to the caller-ID unit (all data is sent at 1200 baud, 0.8333 milliseconds per bit for example). The information is then sent in Multiple Data Message Format (MDMF) as follows:

Message Type – binary 128 for MDMF
Message Length – 1 character (binary encoded 0 – 255, number of characters to follow)
Parameter Type – 1 character (Name = “7” ASCII encoded)
Parameter Length – 1 character (binary encoded 0 – 255)
Message – 1 to 252 characters (each character ASCII encoded)
Checksum – 1 character (binary encoded sum of all information above)

The interface 18 de-mutes the audio to the cellular radio transceiver 16 a fixed time period after the information is sent to the caller-ID unit. The caller-ID unit de-mutes the audio to the POTS telephone a fixed time after the end of the sent-information. The caller-ID unit decodes the information in the message, and displays the characters on its display-screen.

While the above-example has described the display of a stored message, the same principles are applicable to retrieval and display of many types of information available to the micro-controller, such as: as cell broadcast; FWT operational-status information, received radio-signal level and other operational information; information to aid in the setup or maintenance of the FWT at the user-premises; telephone-tariff information (when available from a cellular network); call-timer information, for current call and other periods recorded by the FWT.

Την φόλλωοιγι ισ της σουρχε χοδε φορ δισπλασιν γχαλερ−ιδεντιφικατιν υνφορ ματιν οφ αν
ινχομην χαλλ. Φορ δισπλασινω της, και νοτ της εξενεδειν ενφοματιν διαχωσε
δ αβοσειμ α επιτε-1 χαλλερ-ΙΔ δεσιγε ωουλδ συνηχε. Τηςισ ρουτινε
ισ σταρτεδ ωεν της ραδιο τρανςκιεσερ ρεχεσεσ α στανδαρδ χαλλερ ΙΔ -
μεσαγε, ανδ, ιν τυρν, σενδοιτο το της ιντεφαχε 18. Τηςισ σοτωαρε ρε-
φροματα της δετα το της φοματ αχχεπταβ
ει το της χαλλερ-ΙΔ υνιτ 12, ανδ πλαχεσ το ον της τιπ/ριν λινεσ το της χαλλερ ΙΔ υνιτ.
Τηςισ ρε-φροματινα ενταλσ αδδινγ χηαννελ σειζε βιτς ανδ σταρτ ημαρκγ
βιτς το της
φρονιο της μεσαγε το αλερτ της χαλλερ-ΙΔ υνιτ, πυτινγη της δετα ιν της χορρεχτ με
μεσαγε φοματ, απενδινα χηεκκσμ, ανδ μοδωλατινη της Ι€α και Θεσ οσ οτο αη
της τιπ/ριν λινε (δονε βισ της ΧΜΞ-605 χης). Την, το πυτο της Τονε γενερατορ χηηι βα
χι ιντ νσορμαλ ιδελ στατε. Της σοτωαρε ρεσπονδο το τοω διφερεντ μεσαγες ωει
η χαλλερ-ΙΔ δετα δελισερδ βισ ραδιο τρανςκιεσερ. ΣΔΜΦ χονταινσ μονη/δαυ/ηουρ/
μινυε οφ χαλλ σταρτ φολλωεδ βισ της 10-διγε τελεπνον νυμβερ τηλε νιτιεδε της
χ
αλλ. ΜΔΜΦ ισ ακτυαλλψ χαταβλε οφ δελισερνγ μυχη μορε δετα βυι ισ ήωιεδ ηερε τ
ο φουτ της 10-διγε τελεπνον νυμβερ (Διρεκτορψ Νυμβερ = ΔΝ). Τηςισ μεσαγε
ισ χαπα
βλε οφ ηανδλινη της εξενεδειν ενφοματιν δισπλασ διαχωσε αβοσε.

//
// file : callerid.c
//
// purpose : Caller ID (or Calling Number Delivery) drivers using MX-COM CMX605.
//
// copyright (c) 1999 Telular Corporation, Inc.
//
// $Log: CALLERID.C $
// Revision 1.2 1999/04/28 15:47:32 harryk
// New timers.
// Revision 1.1 1999/04/08 20:47:48 wingt
// Initial revision


#include "int_def.h"
#include "bindef.h"
#include "std_def.h"
#include "rtx51.h"
#include "eeprom.h"
#include "tj11.h"
#include "tj11dec.h"
#include "tj11prot.h"
#include "user_sfr.h"
#include "aproc.h"
#include "tone.h"

extern BYTE init_audio();

extern STATES xdata tj11state;
extern BYTE dtmf_tsk_state;

	// dtmf tone/tsk for MX-COM CMX605 chip

/* -------- global fcn -------- */
BYTE send_callerid(BYTE cnd_msg_len, BYTE *cnd_msg_ptr);

/* -------- global var -------- */
BYTE cnd_xmt_state;  // caller number delivery state
BYTE cnd_xmt_seiz_byte_cnt;  // for cnd xmt use
BYTE cnd_xmt_mark_byte_cnt;
BYTE cnd_xmt_data_byte_cnt;
BYTE *cnd_xmt_data_ptr;

/* -------- local var -------- */
static BYTE offhck_cnt;


*/

// func: send_callerid ;send caller id data to ext device through V.23 modem chip.
// ;This routine adds chn seize bits, mark bits in beginning
// ; and checksum (2's complement arithmetic sum) to the end.
// ; (see belcore spec)

// inp:
BYTE cnd_msg_len ;total message byte length in CND data buffer

//
BYTE *cnd_msg_ptr ;pointer to CND message:

// ; single data message frame format (SDMF)
// ; multiple data message frame format (MDMF)
// ; for SDMF message, ptr to CND data buffer:
// BYTE msg_type; 4
BYTE msg_len; 9 -> 18
char mon[2]; ASCII hilo byte
char day[2];  "
char hr[2];  "
char min[2];  "
char dig[10];  ASCII

dig[0]=msdigit

;for MDM message, ptr to CND data buffer:
BYTE msg_type;  0x80
BYTE msg_len;  variable (depends
on
char param_type;  2 = calling line DN
char dig[10];  ASCII

dig[0]=msdigit

BYTE err_code ;error code:

; 0 no errors
; >0 errors occur

BYTE send_callerid(BYTE cnd_msg_len, BYTE *cnd_msg_ptr)
{
BYTE n, err_code;
BYTE cs;
BYTE *msg_ptr;

err_code = 0; /* start w/ no error */

/* ---- audio pass on slic ---- */
HiBAT = LOW_BATTERY;
set_SLIC_mode(FORWARD_ACTIVE);  // slic needs ~1sec to settle
systask_slow_wait(30);  /* 0.6sec (gap after ring requirement: 0.5-1.5 sec) */

/* ---- setup for caller id ---- */
cbus_send_cmd(CHIP_TONE, CBUS_ADDR_TONE_SETUP, 0x00, 0);  // pwr, no dtmf, 16k, syn, v23
 cbus_send_cmd(CHIP_TONE, CBUS_ADDR_TONE_MODE, 0x60, 0);  // FSK, level 0 (no atten),
field 0
atten_audio(0x25);  // adjust audio to callerid device (range~20-35)
dtmf_sk_state = XMT_FSK_STATE;  // indicate in transmit fsk data state for MX-COM CMX605.
cnd_xml_state = CND_XMT_SEIZ_STATE;  // indicate in caller number delivery chn seize state

cnd_xml_seiz_byte_cnt = 38;  // chn seize "0101..." 300 bits = 37.5 bytes

cnd_xml_mark_byte_cnt = 23;  // mark "1111..." 180 bits = 22.5 bytes

/* ---- build caller id data ---- */
msg_ptr = cnd_msg_ptr;
for (n=0, cs=0; n<cnd_msg_len; ++n) cs += *msg_ptr++;  /* checksum */

/* 2's compl cs */

/* setup for isr to transmit data bits out */
cnd_xml_data_byte_cnt = cnd_msg_len+1;  // tot bytes to xmit: 1 for cs
cnd_xmt_data_ptr = cnd_msg_ptr;

" /* xmt: 300 bits chn seize, 180 bits mark, 12-21 bytes data (max time==0.6sec) */
cbus_send_cnd(CHIP_TONE, CBUS_ADDR_TONE_TXDATA, 0xAA, 0);    // start w/ chn seiz 0101...

/* --- wait for dtmf_fsk_isr to finish transmitting all bits --- */
n = 10;            // 1.0s max timeout
while ((cnd_xmt_state!=CND_XMT_IDLE_STATE) && (j11state==RingBell) && --n) systask_slow_wait(5);
if (cnd_xmt_state != CND_XMT_IDLE_STATE) err_code = 1;    // something wrong!

/* --- return back to dtmf state --- */
init_audio();    // normal audio
if (dtmf_fsk_state = RCV_DTMF_STATE)    // indicate in rcv dtmf tone state for MX-COM CMX605.
    return(err_code);

"*/
WHAT WE CLAIM IS:

CLAIM 1. In a fixed wireless terminal comprising a radio transceiver, a land-type telephone instrument, and an interface means for coupling said telephone instrument with said radio transceiver, said interface means comprising a computer and memory means therefor, the improvement comprising:

caller-identification means for displaying information about an incoming call received by said radio transceiver, said caller-identification means being coupled with said radio transceiver;

said interface means being coupled to said caller-identification means, and comprising software means stored in said memory means for controlling said caller-identification means, whereby, when said radio transceiver receives caller-identification data information from a radio network, said software means controls said caller-identification means to display the information.

CLAIM 2. The fixed wireless terminal according to claim 1, wherein said caller-identification means comprises a caller-identification display unit, and modem means; said modem means being part of said interface means.

CLAIM 3. The fixed wireless terminal according to claim 2, wherein said caller-identification display unit comprises one of a type-1 and type-2 caller-ID display unit.
CLAIM 4. The fixed wireless terminal according to claim 1, wherein software means further comprises telephone-coupling means for coupling said telephone instrument to said caller-identification means; said telephone-coupling means comprising means for sending to said caller-identification means operational information relevant to the operation of at least one of said radio transceiver, said interface means, and radio network with which said radio transceiver operates.

CLAIM 5. The fixed wireless terminal according to claim 4, wherein said caller-identification means comprises a caller-identification display unit, and modem means; said modem means being part of said interface means.

CLAIM 6. The fixed wireless terminal according to claim 5, wherein said caller-identification display unit comprises one of a type-1 and type-2 caller-ID display unit.

CLAIM 7. The fixed wireless terminal according to claim 4, wherein said operational information comprises at least one of: messages received by said radio transceiver, such as cell broadcast or short-message service; operational-status information of the fixed wireless terminal; received radio-signal level and other operational information of said radio transceiver; information to aid in the setup and maintenance of the fixed wireless terminal at the user-premises; telephone-tariff information; and call-timer information, for current call and other periods recorded by said interface means.
CLAIM 8. The fixed wireless terminal according to claim 1, wherein said software means comprises means for directing said caller-identification means to display other, operational information, said other, operational information comprising at least one of: messages received by said radio transceiver, such as cell broadcast or short-message service; operational-status information of the fixed wireless terminal; received radio-signal level and other operational information of said radio transceiver; information to aid in the setup and maintenance of the fixed wireless terminal at the user-premises; telephone-tariff information; and call-timer information, for current call and other periods recorded by said interface means.

CLAIM 9. The fixed wireless terminal according to claim 8, wherein said caller-identification means comprises a caller-identification display unit, and modem means; said modem means being part of said interface means; said software means comprising telephone-coupling means for coupling said telephone instrument to said caller-identification means; said telephone-coupling means comprising means for sending to said caller-identification means said other, operational information.

CLAIM 10. The fixed wireless terminal according to claim 9, wherein said telephone-coupling means of said software comprises means for detecting at least one digit-code entered into said telephone instrument, said at least one digit-code representing a particular type of message of said other, operational information.
CLAIM 11. In a fixed wireless terminal comprising a radio transceiver, a land-type telephone instrument, and an interface means for coupling said telephone instrument with said radio transceiver, said interface means comprising a computer and memory means therefor, the improvement comprising:

display means for displaying selected information about the operation of at least one of said radio transceiver and said interface means;

said interface means being coupled to said display means, and comprising software means stored in said memory means for driving said display means, whereby said selected information may be displayed by said display means; said software means controlling said display means to display the information.

CLAIM 12. The fixed wireless terminal according to claim 11, wherein said interface means couples said telephone instrument to said display means; said telephone instrument being used to input digital codes representing which one of said selected information is to be displayed by said display means; said software means comprising telephone-coupling means for detecting the digital codes entered into said telephone instrument, said software means in response to an entered digital code causing said display means to display the selected information.

CLAIM 13. The fixed wireless terminal according to claim 12, wherein said display means comprises a caller-identification display unit, and modem means for driving said caller-identification display unit.
CLAIM 14. The fixed wireless terminal according to claim 13, wherein said caller-ID display unit comprises a type-2 caller-identification display unit.

CLAIM 15. The fixed wireless terminal according to claim 11, wherein said selected information comprises at least one of: messages received by said radio transceiver, such as cell broadcast or short-message service; operational-status information of the fixed wireless terminal; received radio-signal level and other operational information of said radio transceiver; information to aid in the setup and maintenance of the fixed wireless terminal at the user-premises; telephone-tariff information; and call-timer information, for current call and other periods recorded by said interface means.

CLAIM 16. The fixed wireless terminal according to claim 15, wherein said interface means couples said telephone instrument to said display means; said telephone instrument being used to input digital codes representing one of said selected information is to be displayed by said display means; said software means comprising telephone-coupling means for detecting the digital codes entered into said telephone instrument, said software means in response to an entered digital code causing said display means to display the selected information.

CLAIM 17. The fixed wireless terminal according to claim 16, wherein said telephone-coupling means of said software comprises means for detecting a plurality of different digit-codes entered into said telephone instrument, each said digit-code representing one type of said selected information to be displayed by said display means.
CLAIM 18. The fixed wireless terminal according to claim 11, wherein said display means comprises a caller-identification display unit, said caller-identification display unit also displaying caller-identification information about an incoming call; said software means controlling said caller-identification means, whereby when said radio transceiver receives caller-identification data information from a radio network, said software means controls said caller-identification means to display the information.

CLAIM 19. A method of displaying selected information on a display unit coupled to a fixed wireless terminal, said fixed wireless terminal comprising radio transceiver, a land-type telephone instrument, an interface means for coupling said land-type telephone instrument with said radio transceiver, said interface means comprising a computer, memory means therefor, and software stored in said memory means, and a display unit, said method comprising:

(a) entering a digit-code representing a specific type of said selected information to be displayed by said display unit;

(b) decoding said digit-code by said software;

(c) controlling said display unit by said software to display said specific type of selected information;

(d) said step (a) comprising entering the digit-code using said land-type telephone instrument.
CLAIM 20. The method according to claim 19, further comprising:

(c) automatically displaying on the display unit caller-identification information about an incoming call.

CLAIM 21. In a fixed wireless terminal comprising a radio transceiver and an interface means for coupling a land-type telephone instrument with said radio transceiver, said interface means comprising a computer and memory means therefor, the improvement comprising:

display means for displaying at least one of: selected information about the operation of at least one of said radio transceiver and said interface means; and caller-identification information about an incoming call received by said radio transceiver;

said interface means being coupled to said display means, and comprising software means stored in said memory means for driving said display means, whereby the information may be displayed by said display means; said software means controlling said display means to display the information.

CLAIM 22. The fixed wireless terminal according to claim 21, wherein said radio transceiver comprises a cellular or cellular-like transceiver.

CLAIM 23. The fixed wireless terminal according to claim 21, further comprising a standard, land-type telephone instrument; said telephone instrument being used for inputting codes representing the type of selected information to be displayed; said software means detecting and decoding said codes for controlling said display means in
order to display the type of information that the code input into said land-line telephone instrument represents.

CLAIM 24. The fixed wireless terminal according to claim 21, wherein said display means comprises caller-identification means comprises a caller-identification display unit, and modem means; said modem means being part of said interface means.

CLAIM 25. The fixed wireless terminal according to claim 23, wherein said caller-ID display unit comprises a type-2 caller-identification display unit.
Figure 1 – Functional Block Diagram of FWT

- POTS TELEPHONE
- TYPE 2 CALLER ID UNIT
- FWT INTERFACE CIRCUITS
- CELLULAR RADIO
- Antenna

Connectors:
- Standard Telephone Connection
- Control
- Data
- Audio
Figure 2 – Block Diagram of FWT Interface Circuitry.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   IPC(7) : H04M 3/42  
   US CL. : 455/415
   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. : 455/415, 417, 422, 433, 457, 74, 74.1;
   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)
   EAST/WEST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 4,658,096 A (WEST, Jr. et al.) 14 April 1987, see fig.1-2.</td>
<td>1-25</td>
</tr>
<tr>
<td>Y,P</td>
<td>US 5,924,044 A (VANNAFTA et al.) 13 July 1999, fig.1, 6, 14.</td>
<td>1-25</td>
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<tr>
<td>A</td>
<td>US 5,263,084 (CHAPUT et al.) 16 November 1993</td>
<td>1-25</td>
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<tr>
<td>A</td>
<td>US 4,582,956 A (DOUGHTY) 15 April 1986</td>
<td>1-25</td>
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☐ Further documents are listed in the continuation of Box C.  ☐ See patent family annex.

* Special categories of cited documents:
  *A* document defining the general state of the art which is not considered to be of particular relevance
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  *O* document referring to an oral disclosure, use, exhibition or other means
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