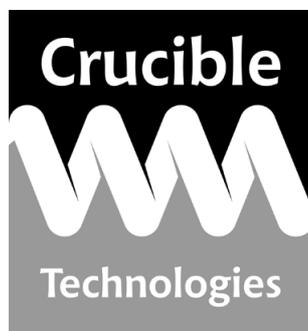
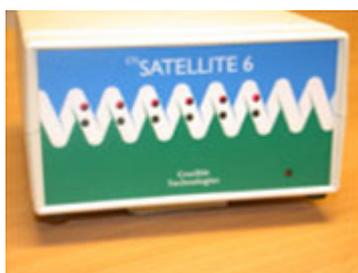


CTI SATELLITE 3 and CTI SATELLITE 6

Multi-line Caller Display device for the PC

General Information for CTI Software Developers



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1.0 GENERAL

CTISatellite interfaces Caller ID data from three or six telephone lines and presents the information on a single COM port of a PC. It also monitors for On-line, Off-line and dialled digits. This allows the unit to be used for full logging of the following details from a telephone call:

- Number dialled or Caller ID
- Time & date of call
- Whether it was answered
- How long the telephone rang
- How long the call lasted

2.0 DESCRIPTION OF OPERATION

Using the leads provided, simply connect the CTISatellite to the required telephone lines. If installing on a site equipped with a PBX (Business Telephone System), make sure that these lines are connected on the External (Trunk) lines and not onto the extensions. If sockets are provided, then simply use a telephone socket doubler to connect the CTISatellite unit in parallel to any equipment already present. If sockets are not provided, then request either your network provider install some, or alternatively connect telephone sockets yourself. Just connect Pins 2 and 5 in the socket to the two lines coming from the Telephone Exchange.

Power to the CTISatellite unit is provided via the AC adapter provided. This provides 9 V at 500 mA. The centre pin of the connector is positive. The unit will not operate without power.

With the COM lead provided, connect the DATA OUT of the CTISatellite unit to a free COM port of a PC. When this is connected and the COM port is enabled, the LED at the bottom right comes ON. When the unit is not connected to the PC, data for up to 40 incoming calls is stored. These are downloaded to the PC when the COM port connection is made and the PC enables the COM port from a particular application. If required, keeping the reset button pressed when power is applied can clear the internal memory. When power is initially applied, the unit sends an identifier to the PC. This is currently set to "SAT V1.8".

The data is sent at 9600 baud with 8 data bits and 1 stop bit. The data format is sent as described below for the Meteor line card. However, the multi-line unit sends additional data to this.

The first byte transmitted from the CTISatellite is always the ASCII 8A, which is a non-printable character. Then a digit is sent to identify the line originating the call. For example: If a call were received on line 3, the message would be as follows.

- 8AH (header), 3 (line originating the data), 80H (first byte of data from exchange)
- (rest of data as specified below in the Meteor line card section)

As ringing is sent, the following message is sent every time there is a burst of ringing.

(This message is also sent, when the telecom product being used goes off-line, after being used).

8AH (header), 3 (line originating data), Off-line

Similarly, if there is an outgoing call on line 5, when the unit doing the dialling goes on-line the following message will be sent.

8AH (header), 5 (line originating data), On-line

When digits 01904659583 are dialled then this will be shown as follows if dialled slowly.

**8AH, 5,0, 8AH,5,1, 8AH,5,9, 8AH,5,0, 8AH,5,4, 8AH,5,6, 8AH,5,5,8AH,
5,9, 8AH,5,5, 8AH,5,8, 8AH,5,3**

However, if the digits are dialled fast, then they will be sent as follows.

8AH,5,0,1,9,0,4,6,5,9,5,8,3

If there is a lot of telephone activity, then the messages can be intermingled, but there is always a valid header identifying the source of the information, i.e. the line number originating the call.

3.0 ACTIVECID

This is an ActiveX component that is available to be pulled into software such as Visual Basic Professional, Visual FoxPro Professional etc. This handles all the above data and makes interfacing the hardware very simple. This is available directly from www.pathwaydata.co.uk

4.0 APPLICATION NOTES

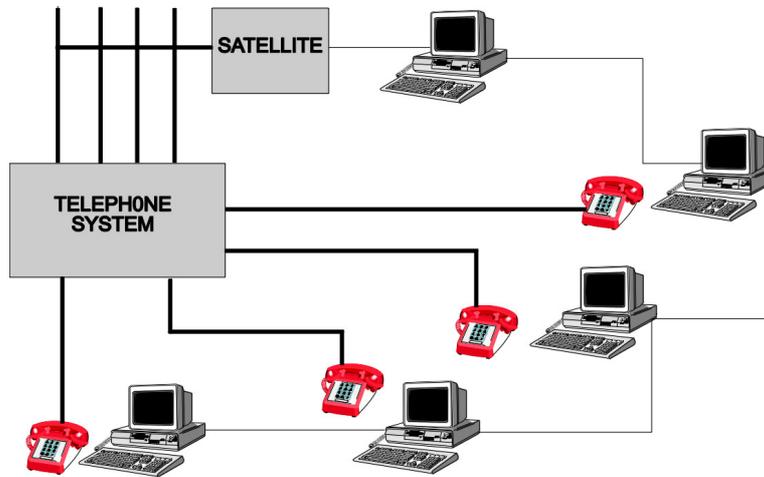
The following describes how the ^{CTI}Satellite products can be used in small offices to provide integration between Computer and Telephony systems (CTI).

^{CTI}Satellite is a call-logging product, which monitor the following activities on analogue telephone lines:

- Incoming caller ID
- Outgoing dialled digits
- Ringing
- Call Answer and Hang up (giving call duration)

These activities are reported to a PC via a serial (COM) port. This product can be used on any analogue telephone line that has Caller Display enabled. Most

telephone systems are not capable of passing Caller ID through to the extensions and as a result, this important business tool is lost to users. The CTISatellite can be used to overcome this, by using the PC network to pass the information around the company. Below is a diagram of how this is achieved.



Once Caller ID and other information is presented to the user of a telephone system, there are many possible benefits that follow. ie

- a) A dynamic window can display telephone activity in the company. Below is an example of such a window:

LIN E	DESCRIPTIO N	STATU S	TEL NUMBER	NAME	DURATION
1	TP Line 1	In	020 8233 2456	Accountant	4 min. 45 S
2	TP Line 2	Idle	----	----	----
3	CT Line 1	Out	01904 780083	Ebor Heating	2 min. 30 S
4	CT Line 2	Ringing	0161 706 0976	ABC Stores	4 rings
5	Fax Line	Idle	----	----	----
6	TP Line 3	Ringing	01642 334422	Kay Electrical	3 rings

This will allow all users to see at a glance that lines 4 and 6 need answering and who the calls are from. If everyone is busy, at least the information required to establish the priority of the caller is provided and one of the current calls placed on hold if necessary to take one of the new calls.

If a key telephone system with special system telephone is in use, then the button relating to that line is pressed to answer the call. If a PBX with standard telephones is in use, particular outside line can be selected by dialling a system code.

The dynamic window also gives an overview of office activity to the office manager, without having to leave the desk.

- b) Using the caller's number to go directly to a database will provide additional benefits. In this database could be a historical log of telephone contact with that customer, whether incoming or outgoing. This is done automatically without any keyboard input. An example of this log is shown below:

Time & Date	In/Out	Number	Description	Duration	Answered
09:15 12/01	In	0161 743 9651	Main	3 min. 22 S	Y
12:05 12/01	Out	0161 743 9651	Main	1 min.	----
10:05 14/01	In	0973 177888	Mobile	4 min. 12 S	Y
14:10 23/01	in	0161 743 9654	Fax	1 min. 18 S	Y

The different telephone numbers are associated with the same caller, so show up in the same record. For example, there is a record of a fax from the customer on the 23rd January.

Notes can supplement the above log in the customer's or contact's personal record if required. Both the automatic log and extra notes can be used to provide a better service to customers.

- c) Analysis of all the telephone activity, on say a monthly basis, will be useful to office managers or owners of a small business. This analysis can be used to provide a listing of the most expensive calls. This may show excessive use of the telephone for personal use, or a need to move to a cheaper network provider.

Analysis of the number of rings before a call is answered could point to the need for extra staff. If there is a peak in the morning, this could be met with part-time staff.

If billing is based on time spent on the telephone, then the total time spent with a particular customer can be calculated, including both incoming and outgoing calls.

Summary

The use of a ^{CTI}Satellite product leads to many benefits to the small company. Some of these are of day-to-day benefit in the use of the telephone, whilst others provide longer-term management data.

5.0 GENERAL INFORMATION ON METEOR LINE CARD

The meteor line card is a device for decoding the Caller ID from the telephone line. It also detects dialled digits and the telephone going on/off hook, Number dialled or Caller ID

The following information describes the operation of the line card and gives some details about the presentation of the data. Some information regarding Caller ID is also presented.

6.0 SPECIFICATION OF THE METEOR LINE CARD

There are four major types of Caller ID to be found around the world. They can be categorised as follows:

- US FSK: Ring, FSK data, Ring.
- ETSI FSK: Ring, FSK data, Ring.
- BT FSK: Line reversal, FSK data, Ring
- ETSI DTMF: Ring, DTMF data, Ring

The Meteor line card is designed to work with all of the FSK data formats ie US FSK, ETSI FSK and BT FSK. It can do this because it detects ring OR line reversal signal as the start of the Caller ID sequence.

There are minor differences between the FSK types as to how the data is formatted. However, the Meteor line card does not try to interpret the data it receives from the PSTN. It checks the data for errors by using the checksum and then passes it as received to the PC. In this way, any differences between the FSK types can be resolved with the application running on the PC.

The Meteor line card detects and reports the following events on the telephone line:

- Ring
- Line reversal
- Caller ID
- Off-hook (from any extension)
- On-hook (from any extension)
- DTMF dialling (from any extension)

7.0 HARDWARE

When power is applied the red LED comes on to indicate that the unit is ready to receive messages. When a call comes in, the red LED flashes to indicate ringing. The green LED flashes briefly to indicate that data is being received. This can be a useful diagnostic, eg to check that the service has actually been switched on by BT, or that the telephone line is connected. When an extension telephone is off-hook, the red LED flashes continuously.

8.0 EXAMPLES OF DATA

The data is sent whenever there is activity on the telephone line. The Meteor line card does not receive any data from the PC. Below are examples of the data that is sent. Remember that this is packaged by the ^{CTI}Satellite before being sent to the PC at 9600 baud.

8.1 Ring with no Caller ID.

EVENT	MESSAGE
Ring	OFF-LINE <cr>
Ring	OFF-LINE <cr>

Notes: It is up to the PC application to determine whether the OFF-LINE data represents ringing. For example, if the unit is in use in the UK, the silence between the ring bursts is 2 seconds. If there is a gap, of say less than 3 seconds between the ringing, then the OFF-LINE messages can be interpreted as reporting ringing. If the gap is more than 3 seconds, then it may be odd transients, or line reversals that have caused the OFF-LINE to be generated.

8.2 Caller display and ringing followed by answer and then hang-up

EVENT	MESSAGE
Caller display	caller display data
Ring	OFF-LINE <cr>
Ring	OFF-LINE <cr>
Answer	ON-LINE <cr>
Hang-up	OFF-LINE <cr>

Notes: The fact that call answer is reported allows the PC application to monitor answered and unanswered calls. If the telephone conversation is being recorded, then this could start at the point of answer.

8.3 Off-hook, dial and hang-up

EVENT	MESSAGE
Off-hook	ON-LINE <cr>
Dial 653265	653265
Hang-up	OFF-LINE <cr>

Notes: The reporting of outward dialled digits allow logging of all calls with duration.

9.0 CALLER ID DATA STRUCTURE

Within the FSK data types, there are two types of message structures. The one used in Europe (including the UK) and most of the US is known as the Multiple Data Message Format, MDMF, and is described below. The other message structure is known as the Single Data Message Format, SDMF, and is not described here. It is only used in some parts of the US. The MDMF Caller ID message typically consists of the following.

Message type (always sent)	1 byte	
Message length (always sent)	1 byte	(= all the bytes to follow, except the Checksum)
Parameter type (at least 1 sent)	1 byte	
Parameter length Parameter	1 byte	(= x) x bytes (actual displayable information)
Parameter type Parameter length Parameter	1 byte	(= y) y bytes (actual displayable information)
....		(more parameters. Actual number of parameters sent can be 1 or more)
Checksum	1 byte	(used for checking for any errors)

Message type

For valid Caller ID this will in most instances be 80H. For message waiting 82H is sent but this is little used. In general, if 80H is not received from the serial port, the whole Caller ID string can be discarded.

Message length

This is a total of all the bytes to follow, except the Checksum. It is useful as an error check.

Parameters

This is the actual payload of the Caller ID data. There are a number of parameters that are defined. The most important ones are outlined below. Any other parameters received need to be accounted for, but then can be ignored.

9.1 Time & Date=01H

This parameter is always sent with a length of 8 and is structured as follows. (This can be assumed to be "real time" accurate to within 1 minute and can be used to update the PC clock if required.)

First 2 bytes	Month
Next 2 bytes	Day
Next 2 bytes	Hours
Last 2 bytes	Minutes

9.2 Calling Line Number=02H

The maximum length of the number sent is 18 characters. Spaces and/or dashes are sent as delimiters.

9.3 Reason for absence of number=04H

This parameter is set as follows:
 WITHHELD=50H (P ASCII)
 UNAVAILABLE=4FH (O ASCII)

9.4 Calling Line Name=07H

This parameter was initially designed to send the callers name. However, international calls have "INTERNATIONAL" in this field, and some payphone calls have "PAYPHONE" in this field..

9.5 Call Type=11H

This parameter is only sent for ETSI FSK and BT FSK. In general it can be ignored. There are three call types defined:

Voice call	01H
Ring back when free	02H
Message waiting	81H

Notes: The parameters can be sent in any order.

10.0 MESSAGE EXAMPLE

Byte sent (decimal)	Description
128	Message Type
34	Message Length
17	Call Type Parameter
1	Parameter length
1	Call type = 1 (Voice Call)
1	Date & Time Parameter
8	Parameter length = 8
49	1
48	0 (Month = 10)
49	1
48	0 (Day = 10)
48	0
51	3 (Hour = 3)
51	3
48	0 (Minutes = 30)
2	Calling Number Parameter
10	Parameter length = 10
49	1
50	2
51	3
52	4
53	5
54	6
55	7
56	8
57	9
48	0 (Number = 1234567890)
7	Calling Name Parameter

7	Parameter length = 7
80	P
69	E
84	T
69	E
82	R
32	(Space)
82	R
161	Checksum

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