

Versatile Telecom Interface

Introduction

The Versatile Telecom Interface (VTI) is designed to give software developers full control over the telephone line and provide a link with the PC. It has the following features.

- 2 telephone line connections. VTI can dial on these 2 telephone lines under PC control. VTI can also monitor tones, such as dial, busy and unobtainable tone. On incoming calls, VTI receives and passes on caller ID to the PC. It can monitor both lines simultaneously.
- 6 local extensions. Under PC control the VTI can ring telephones and pass on caller ID to them. It can also receive dialling from the telephones and pass these to the PC.
- Audio connections to the MIC and SPK connections of the PC soundcard. VTI can connect these to either the outside telephone line or telephone extensions, under PC control.
- Built in Solid-State voice storage. This can be used to program up to 6 short (30 second) messages that can be played to outside telephone line or telephone extensions, under PC control.

The Connectors available on VTI are as follows.

- RS232 connection to the PC
- 2 stereo connectors to the PC sound card (MIC and SPK)
- 2 RJ11 sockets for connection to telephone lines.
- 6 BT sockets for connection of telephones
- Screw terminals for both telephone line and extensions.
- IEC socket for mains input

The following leads are supplied with VTI

- RS232 lead for connection to the PC with branch leads for audio (MIC and SPK).

- 2 telephone leads
- IEC power lead

Application examples for VTI

- Use of VTI to answer incoming calls and play dedicated message to caller, dependent on their caller ID. e.g. if your wife calls, you can have a private message that plays only if calls received from her mobile. The messages are stored on the PC and played via the sound card.

If for example you get a call from a withheld telephone number, then a polite rejection message could be played automatically and the line hung up.

- Every telephone connected to VTI can effectively become control devices for home automation purposes. E.g. pick up the telephone and dial a specific code. PC can now play voice messages to the telephone, using the sound card. These can be voice prompts and the user can send controls via the telephone keypad. For the more adventurous controlling appliances with voice recognition may be a challenge.
- Similarly, VTI lets outside callers control devices via the PC using their telephone keypad (or spoken commands).
- As VTI has 2 lines, it is also possible to transfer certain calls out to mobiles. E.g. the caller could be given the option of leaving a message, or contacting the owner on his mobile. If the latter option is chosen via the telephone keypad, then the second line can be used to contact the owner and the two lines connected.

Summary

VTI is an open architecture product that enables software developers to get the maximum benefit from their telephone line,

PC and telephones. The only limitation is the programmers' imagination.

Functional Specification

Com port set-up

Baud rate	9600
Start bit	1
Data bits	8
Stop bit	1
Parity	No

Command information

When sending commands to the VTI, the following procedure is recommended to ensure error free operation.

Send command
Wait for *G, *B or *F response
If *G received then continue
If timeout occurs without a response, then resend command.

When a command is sent to the VTI it will respond as follows.

*G valid or good command
*B invalid or bad command
*F failed command ie a valid command that could not be executed

Telephone lines

Each telephone line provides the following functions.

Telephone line loop (seize) command

/T1L This command loops telephone line 1
/T2L This command loops telephone line 2

Telephone line release (hang up) command

/T1R This command releases telephone line 1
/T2R This command releases telephone line 2

Ring reporting

*T1RN	This reports normal ringing on telephone line 1
*T2RN	This reports normal ringing on telephone line 2
*T1RC	This reports Call Sign ringing on telephone line 1
*T2RC	This reports Call Sign ringing on telephone line 2

(Call Sign is a special service from BT. You get a second number for a line. If that number is dialled, the line rings with a different pattern. i.e. it rings for 1 second followed by a 2 second pause)

Caller ID reporting

If Caller ID (CLI) is received on a telephone line, then this is reported as follows.

*CST1	CLI data starting for telephone line 1
*CDmddhhmm	CLI Date & time
*CCccccccc	CLI number
*CNnnnnnnn	CLI name (if present)
*CRr	Reason for no number (O=unavailable P=withheld)

*CE CLI data finished

DTMF reporting

The DTMF/TONE resource has to be connected for this (see later under system resources). Once connected, the DTMF digits detected are reported as follows.

*MT11 digit 1 detected from telephone line 1
*MT12 digit 2 detected from telephone line 1
.....
.....
*MT21 digit 1 detected from telephone line 2
*MT22 digit 2 detected from telephone line 2

Call Progress Detection

This is used for checking activity on a trunk line. Initially the Call Progress has to be enabled. (It is normally disabled)

/P11 enables call progress detection on telephone line 1
/P10 disables call progress detection on telephone line 2
/P21 enables call progress detection on telephone line 2
/P20 disables call progress detection on telephone line 2

Once enabled, the VTI will report activity if there is any change in status on the line. For line 1, the reports are as follow.

*P1Q when there has been at least 4 seconds of silence
on line 1
*P1C when there has been at least 4 seconds of tone on
line 1
*P1B when there has been a whole cycle of busy tone on
line 1

(as busy tone has a fairly short cycle, it is recommended that one waits for 2 reports of busy tone before validating this)

*P1R when there has been a whole cycle of ring tone on line 1
*P1P when there has been a line transient on line 1
*P1S when there has been a Special Information Tone (SIT) on line 1

Reports for line 2 are similar.

*P2Q when there has been at least 4 seconds of silence on line 2
.....
.....

Send Recall to telephone line command

/T1T This command sends a Time break recall to telephone line 1
/T2T This command sends a Time break recall to telephone line 2

Extension ports

Each extension port provides the following functions

Ring command

/E1R1 This command sends standard UK ringing to extension 1
/E2R1 This command sends standard UK ringing to extension 2
.....
.....
/E6R1 This command sends standard UK ringing to extension 6

The ring pattern for this is as follows.

R1 400mS ON 200mS OFF 400mS ON 2000mS OFF

Other ring patterns are available as follows.

R2 1000mS ON 2000mS OFF

R3 1000mS ON 500mS OFF 1000mS ON 500mS OFF

R4 200mS ON 2800mS OFF

R5 200mS ON 200mS OFF 200mS ON 2400mS OFF

R6 200mS ON 200mS OFF 200mS ON 200mS OFF

 200mS ON 2000mS OFF

R7 200mS ON 200mS OFF 200mS ON 200mS OFF

 200mS ON 200mS OFF 200mS ON 600mS OFF

/E1R0This command turns ringing OFF to extension 1

.....

.....

/E6R0This command turns ringing OFF to extension 6

Send Caller ID command

Before sending the information, the relevant parameters need to be set.

/CDmddhhmm set CLI date & time

/CCcccccccc set CLI calling number

/CNnnnnnnnn set CLI calling name

/CRr set reason for absence of number

Then the caller ID can be sent to the relevant extensions. The first 4 digits after the CS selects which of the above 4 are sent and the next 6 digits selects which of the extensions the Caller ID is sent to.

First digit enables/disables time & date

Second digit	enables/disables number
Third digit	enables/Disables reason for absence
Fourth digit	enables/disables name

E.g. /CS1100100000 send CLI time & number to ext 1 only

/CS1101111111 send CLI time, number & name to ext 1,2,3,4,5 & 6

The VTI will send *CS back to the PC when the caller ID has been sent to the selected extensions.

Dial, busy tones to extension

The DTMF/TONE resource has to be connected for this (see later). Once connected, the following command will apply the relevant tone to the extension.

/OE18	This command sends dial tone to extension 1
/OE19	This command sends busy tone to extension 1
/OE11	This command sends ringing tone to extension 1
.....	
.....	
/OE68	This command sends dial tone to extension 6
/OE69	This command sends busy tone to extension 6
/OE61	This command sends ringing tone to extension 6

A summary of the tones are available as follows.

0	silence
1	Same cadence as R1 (standard UK ringing tone)
2	Same cadence as R2
3	Same cadence as R3
4	Same cadence as R4
5	Same cadence as R5
6	Same cadence as R6
7	Same cadence as R7

- 8 Continuous
- 9 500mS ON 500mS OFF (busy tone)
- 10 100mS ON (not repeating)
- 11 100mS ON 100mS OFF 100mS ON 100mS OFF 100mS
- ON
- 100mS OFF (not repeating)
- 12 100mS ON 2900mS OFF

DTMF reporting

The DTMF/TONE resource has to be connected for this (see later). Once connected, the DTMF digits detected are reported as follows.

- *ME11 digit 1 detected from extension 1
- *ME12 digit 2 detected from extension 1
-
-
- *ME61 digit 1 detected from extension 6
- *ME62 digit 2 detected from extension 6

Extension on/off hook reporting

- *E1L This reports extension 1 going on line
- *E1H This reports extension 1 going off line
-
-
- *E6L This reports extension 6 going on line
- *E6H This reports extension 6 going off line

Time break Recall reporting

- *E1T Time break recall on extension 1
-
-

*E6T Time break recall on extension 6

General commands

/S resets the system

The response to this is

*ON

*VX.Y (where X and Y are numerals. E.g. V1.8)

Power ON

When power is initially applied to the system, it responds as follows.

*ON

*VX.Y (where X and Y are numerals. E.g. V1.8)

/V returns the software version

The response to this is

*VX.Y (where X and Y are numerals e.g. V1.8)

System resources

The VTI system has the following resources.

Cross Connection matrix

This is used to connect extensions, trunks and/or various resources together. The devices available for connection are as follows.

E1 extension 1

E2 extension 2

E3 extension 3
E4 extension 4
E5 extension 5
E6 extension 6

T1 trunk 1
T2 trunk 2

I PC microphone
O PC speaker output
G DTMF/TONE resource
H Music on Hold
M MF generator
S Solid state recorder

/XCE1E2 This command will connect extensions 1 & 2 together.

/XCE1T1 This command will connect extension 1 & trunk 1 together.

/XCT1O This will connect the PC speaker output to trunk 1

.....

.....

/XCT1M This will connect the MF generator to trunk 1

Once the use of the device is finished the connection must be "torn up" as follows.

/XDE1 This will tear up ALL device connections from extension 1.

/XDE2 This will tear up ALL device connections from extension 2.

.....

.....

/XDE6 This will tear up ALL device connections from extension 6.

/XDT1 This will tear up ALL device connections from trunk 1.

/XDT2 This will tear up ALL device connections from trunk 2.

ALL connections on the matrix can be reset by the following command.

/XR This resets the matrix completely.

[Note: It is very important to tear up the connections when you have finished with them. If this is not done, then problems can occur due to wrong, unwanted connections. It is a good idea during quiescent periods to issue an /XR command to reset the matrix.]

DTMF/TONE resource

This resource is used to generate tones (such as dial, busy and ringing) and detect DTMF tones. There are only four of these, so they have to be connected when required.

/XCE1G This connects a DTMF/TONE resource to extension 1. This needs to be done, before DTMF reporting can take place or tones can be generated to extension 1.

[Note: For example, when an extension comes off hook, then the DTMF/TONE resource can be connected to send dial tone to the extension and to detect any DTMF digits dialled.]

PC microphone

Audio from other devices is presented to the PC microphone using this device.

/XCE1I This connects the PC microphone to extension 1.

1. /XCT11 This connects the PC microphone to telephone line

PC speaker output

This device presents audio from the PC speaker output.

/XCE20 This connects the PC speaker output to extension 2.
/XCT20 This connects the PC speaker output to telephone line 2.

MF generator

This device generates MF tones and can be used for dialling.

/XCT1M This connects the MF generator to telephone line 1
/Mabcdef This command dials digits abcdef to line

The response *MD is received when all digits are dialled.

Solid State Recorder

This device can be used to record up to 6 short voice messages that can be played back to callers. To record a message the telephone connected to extension 1 has to be used.

/RR1 start recording message 1
/RS stop the recording
/RP1 playback message 1

When the message is finished, the VTI responds with *RS

Music On Hold

This device always has internal or external (selected by a jumper) music available. It can be used to play music to say a caller on hold on a trunk line.

/XCT1H This connects trunk 1 to the Music on hold device.

Power fail & fail-safe operation

If power is cut off to the VTI, then the external 2 lines are connected directly to extension 1 and 2. These telephones can then provide back up operation till power is restored.

The VTI also has a fail-safe mode of operation built in, in case of a PC failure or lock up. In the absence of any other commands from the PC, the VTI expects at least one /V command from the PC in any 60 second period. If this is not received, then it connects external lines 1 & 2 to extensions 1 and 2 to provide back up operation. Once the PC is operational again, these connections are removed on receipt of a /V.

Sample application

The PC-PBX is a PC controlled PBX. This consists of a VTI and a software application that provides for a 2-line telephone system. When this application is used, one can study the COM port commands to get a full understanding of how these are used.

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