

Voice Features Guide for Windows 2000

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Table of Contents

1. Introduction to Voice Features.....	6
1.1. Call Analysis Overview.....	6
1.2. General Tone Detection/Generation	6
1.2.1. General Tone Detection	
1.2.2. General Tone Generation	
1.3. Speed and Volume Control.....	7
1.4. SCbus Overview.....	7
1.5. Voice Product Terminology	7
1.6. Organization of This Voice Features Guide	7
2. Call Analysis	9
2.1. What Is Call Analysis?.....	9
2.2. What Does Call Analysis Detect?	9
2.3. How Does Call Analysis Work?.....	10
2.4. How to Enable PerfectCall Call Analysis.....	12
2.4.1. Modifying the Default Tone Definitions	
2.4.2. Activating PerfectCall Call Progress	
2.5. How to Use Call Analysis.....	13
2.5.1. Set Up the Call Analysis Parameter Structure (DX_CAP)	
2.5.2. Use the <code>vpm_dial()</code> Function to Initiate Call Analysis	
2.5.3. Determine the Outcome of the Call.	
2.5.4. Obtain Additional Call Outcome Information	
2.6. How the DX_CAP Controls Call Analysis	18
2.6.1. Cadence Detection in Basic Call Analysis	
2.6.2. Tone Detection in PerfectCall Call Analysis	
2.6.3 Positive Voice Detection	
3. General Tone Detection/Generation.....	29
3.1. General Tone Detection/Generation Overview	29
3.2. General Tone Detection (GTD)	29
3.2.1. Defining GTD Tones	
3.2.2. Building Tone Templates	
3.2.3. Working with Tone Templates	
3.2.4. Tone Event Retrieval	
3.2.5. Maximum Number of Tone Templates	
3.2.6. Applications	
3.3. General Tone Generation (GTG).....	34

3.3.1. General Tone Generation Functions.....	
3.3.2. Building and Implementing a Tone Generation Template	
4. Speed and Volume Control	36
4.1. Speed and Volume Control Overview.....	36
4.2. Voice Software Speed and Volume Support	36
4.2.1. Speed and Volume Convenience Functions	
4.2.2. Speed and Volume Adjustment Functions	
4.2.3. Speed and Volume Modification Tables.	
4.2.4. Play Adjustment Digits	
4.3. Using Speed and Volume Control.....	40
4.3.1. Setting Adjustment Conditions.	
4.3.2. Explicitly Adjusting Speed and Volume	
5. Voice Features Demonstration Programs.....	42
5.1. Multithreaded Text Based Application Program.....	42
5.2. Multithreaded GUI Based Voice Features Application Program.....	42
 Appendix A	 44

List of Tables

Table 1. Special Information Tone Sequences 20

Table 2. Maximum Memory and Tone Templates (for Dual Tones)..... 52

Table 3. Purpose of Signal Groups and Changeover in Meaning 62

Table 4. Speed Modification Table 78

Table 5. Volume Modification Table..... 79

List of Figures

Figure 1. Basic Call Analysis Components..... 9

Figure 2. PerfectCall Call Analysis Components..... 10

Figure 3. Call Analysis Outcomes for Basic Call Analysis..... 16

Figure 4. Call Analysis Outcomes for PerfectCall Call Analysis..... 17

Figure 5. A Standard Busy Signal 19

Figure 6. A Standard Single Ring..... 19

Figure 7. A Type of Double Ring..... 19

Figure 8. Cadence Detection 20

Figure 9. Elements of Established Cadence 21

Figure 10. No Ringback Due to Continuous No Signal..... 23

Figure 11. Cadence Detection Salutation Processing 25

1. Instruction to Voice Feature

Voice Feature	Overview	Windows 2000	Voice
Software	guide		
? Call Analysis			
? General Tone Detection and Global Tone Generation			
? Speed and Volume Control			
? Demonstration Program			

1.1 Call Analysis Overview

Call Analysis Public Switched Telephone Network(PSTN) dial call
 monitor . Call Analysis Basic Call Analysis
 PerfectCall Call Analysis가 .
 PerfectCall Call Analysis signal , fax machine
 . Basic Call Analysis PerfectCall Call Analysis가
 application .

Call Analysis input Call Analysis parameter (DX_CAP) data structure
 vpm_dial() .

Call Analysis Voice board .

Call Analysis Chapter2. Call Analysis .

1.2 General Tone Detection/Generation

General Tone Detection Global Tone Generation Voice Board
 .

1.2.1 General Tone Detection

General Tone Detection Voice board가 DTMF tone(0-9,*,#) single
 dual frequency tone GTD , detect . tone
 , tone 가 tone , tone
 . tone , Voice library GTD

tone detection .

General Tone Detection
Generation .

Chapter 3. General Tone Detection

1.2.2 General Tone Generation

General Tone Generation TN_GEN template data structure ,
tone , 가 vpm_playtone() tone
play . vpm_bldtnngen() TN_GEN template .

1.3 Speed and Volume Control

Speed Volume control VPM400, VPM800, VPM1600 .

data structure가 play speed volume data
structure Chapter 4. Speed and Volume Control .

1.4 SCbus Overview

SCbus Signal Computing System Architecture Voice, Telephone network
interface telephony resource realtime, high speed, time division
Multiplexed (TDM) communication bus . SCbus board voice channel analog
channel board channel device .
SCbus SCbus routing SCbus Routing Function Reference for Windows
2000 .

1.5 Voice Product Terminology

Guide .
VPM400 4 channel 가 Voice Board .
VPM800 8 channel 가 Voice Board .
VPM1600 16 channel 가 Voice Board .
FPM SCT FAX resource 가 .
Firmware load file VPM board SPM board download firmware file ,
exe 가 .

1.6 Organization of This Feature Guide

Voice Software Reference for Windows 2000 Windows 2000 Voice Software

Voice Feature

Chapter 1. Introduction to Voice Features Voice Feature Overview

Chapter 2. Call Analysis Call Analysis DX_CAP Call Analysis structure

Chapter 3. General Tone Detection/Generation General Tone Detection General
Tone Generation

Chapter 4. Speed and Volume Control Play-speed Play-volume

Chapter 5. Voice Feature Demonstration Program Demonstration Program

Appendix A SCT list , Glossary Index가

2. Call Analysis

Call Analysis

. Call Analysis

Voice Board

2.1 What Is Call Analysis?

Call Analysis signal Public Switched Telephone
Network(PSTN) dial call
Call Analysis dialing dial monitor , Call

Call Analysis ,
? Line , answer가
? Line Ring
? Line busy
? Call 가

Call Analysis Basic Call Analysis PerfectCall Call Analysis가
PerfectCall Call Analysis signal , fax machine
. Basic Call Analysis PerfectCall Call Analysis가
application
, Application PerfectCall Call Analysis가
Call Analysis call vpm_dial() dial ,
Call Analysis parameter structure(DX_CAP) input
DX_CAP parameter application
Voice Driver가 Call , Extended Attribute
. Call Analysis ,2.5 How
To Use Call Analysis

2.2 What Does Call Analysis Detect?

Call Analysis 가 Call
No Ringback : signal pattern
Connect : 가
No Answer : Line ring
Busy : Busy signal

2.3 How Does Call Analysis Work?

Call Analysis Call
? Cadence Detection
? Frequency Detection
? Positive Voice Detection

technique

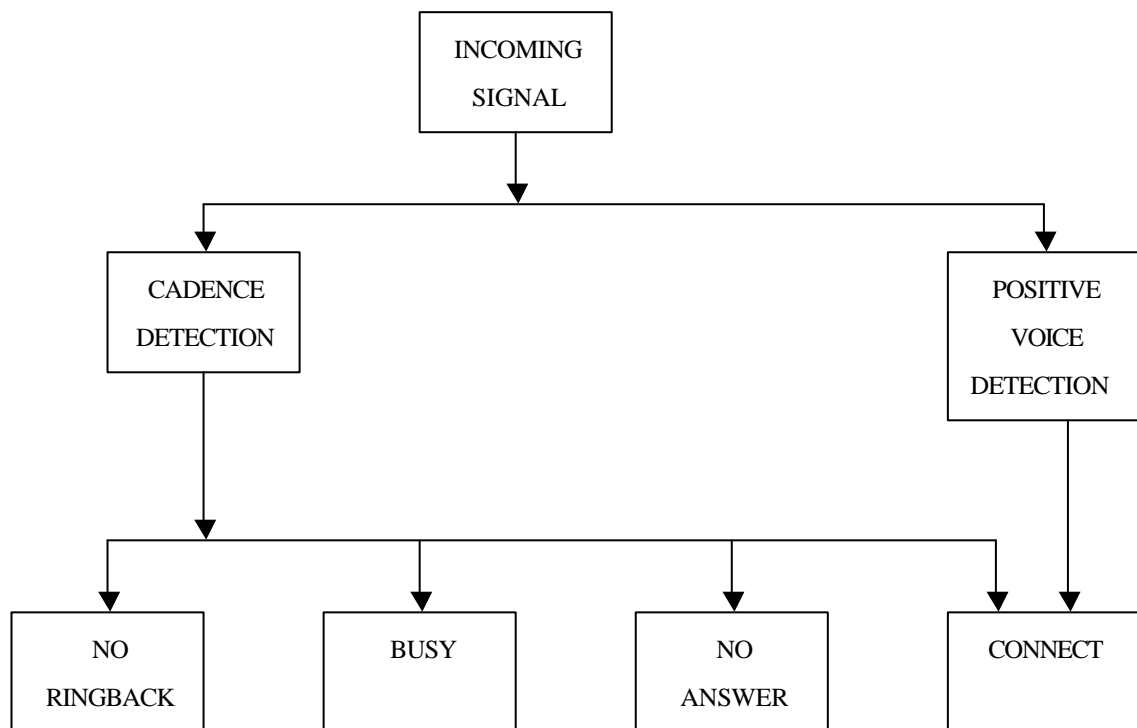


Figure 1. Basic Call Analysis Components

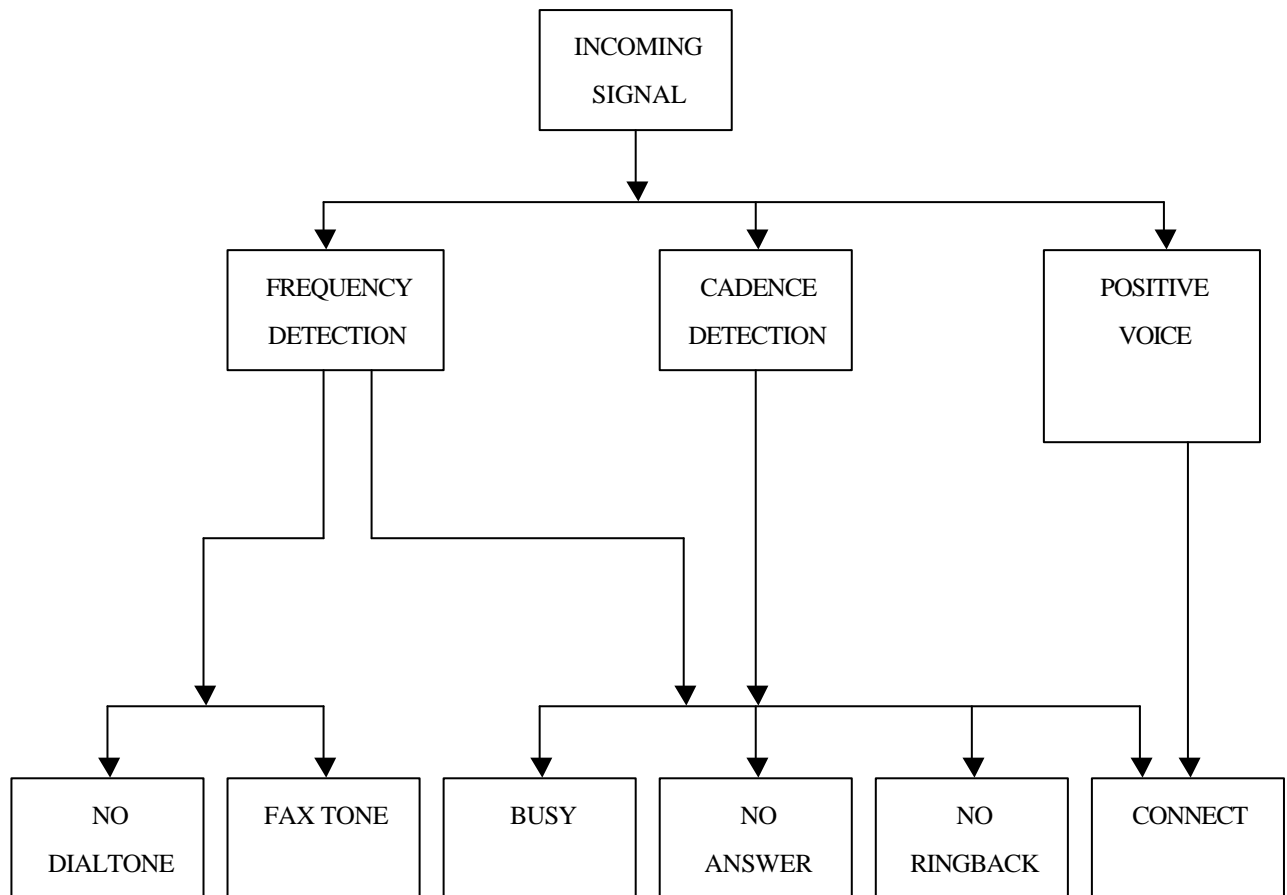


Figure 2. PerfectCall Call Analysis Components

Frequency Detection, Cadence Detection, Positive Voice Detection, Positive Answering Machine Detection Call Analysis . DX_CAP call Analysis 2.6 .

Cadence detection Basic Call Analysis , No ringback, busy, No Answer .

PerfectCall Call Analysis Cadence Detection Frequency Detection , signal fax machine frequency .

Connect Cadence detection Frequency Detection, Positive Voice Detection,

2.4 How to Enable PerfectCall Call Analysis

channel PerfectCall Call Analysis

NOTE : procedure channel

vpm_dial() outgoing PefectCall Call Analysis

1. dial tone, busy tone, fax tone, ringback signal 가

vpm_chgfreq(), vpm_chgdur(),

vpm_chgrepcnt()

2. vpm_initcallp() , PerfectCall Call Analysis가 ,

vpm_delteones() , PerfectCall Call Analysis가 .

channel tone template , vpm_initcallp()

vpm_delteones() . vpm_deltone() channel

GTD tone .

2.4.1 Modifying the Default Tone Definitions

PerfectCall Call Analysis 3 type dial tone, 2 busy tone, ringback tone, fax tone General Tone Detection(GTD)tone

. tone definition signal frequency, duration, repetition count

signal single tone dual tone .

Voice Driver tone 가 . tone default ,switching , application tone

default tone , tone 가

? vpm_chgfreq() single frequency dual frequency 가 tone frequency

? vpm_chgdur() tone cadence deviation .

? vpm_chgrepcnt() tone repetition count .

tone , PerfectCall Call Analysis

channel PerfectCall Call Analysis ,

vpm_initcallp()가 , channel

tone . ,vpm_initcallp() tone

channel tone 가

Voice Programmer's Guide For Windows 2000

2.4.2 Activating PerfectCall Call Progress

PerfectCall Call Analysis channel . PerfectCall Call Analysis가 Channel vpm_initcallp() 가 . vpm_initcallp() , local dial tone, international dial tone, extra dial tone, 2 busy tone, ringback, 2 fax tone tone , channel PerfectCall Call Analysis . tone , tone channel vpm_deltone() tone , tone definition 가 , vpm_initcallp() . vpm_deltone() PerfectCall Call Analysis , General Tone Detection tone . vpm_initcallp() vpm_deltone() Voice Programmer's Guide for Windows 2000 .

2.5 How to Use Call Analysis

Procedure Call Analysis가 Outbound call 가 .

1. Call Analysis operation parameter Call Analysis parameter structure(DX_CAP) .
2. Call Analysis vpm_dial() .
? vpm_dial() 가 , Call Analysis가 vpm_dial()
(TDX_CALLP event) , Event Management .
? vpm_dial() 가 , 0 .
operation Voice Programmer's Guide for Windows 2000
vpm_dial() .
3. Call ATDX_CPTERM() .
no ringback CR_NORB
busy signal CR_BUSY
no answer CR_NOANS
fax machine CR_FAXTONE
no dial tone CR_NODIALTONE
connect CR_CNCT
Call Analysis stopped CR_STOPD

Call Analysis error CR_ERROR
 NOTE : vpm_dial() , vpm_dial()

4. 가 ,frequency, cadence Extended Attribute function

page

NOTE : , Voice Programmer's Guide for Windows 2000
 chapter
 ? vpm_dial(), chapter 3
 ? ATDX_CPTERM, chapter 3
 ? DX_CAP data structure, chapter 4

2.5.1 Set Up the Call Analysis Parameter Structure(DX_CAP)

vpm_dial() dial Call Analysis . DX_CAP structure
 parameter가 , DX_CAP structure default ,
 DX_CAP structure NULL .
 parameter , vpm_dial() Call
 Analysis Parameter structure . DX_CAP parameter
 ? Call Analysis .
 ? Performance .
 ? System .
 ? Called party가 busy , 가

Call Analysis DX_CAP structure
 1. DX_CAP structure , parameter 0 ,
 vpm_clrcap() . value 0 parameter default value가
 . vpm_dial() DX_CAP structure NULL
 , default call analysis parameter가 가
 2. default value parameter , parameter

DX_CAP block parameter , 2.6 .

2.5.2 Use the vpm_dial() Function to Initiate Call Analysis

vpm_dial() Call Analysis , mode argument

DX_CALLP . Call Analysis가 vpm_dial() 가

vpm_dial() Voice Programmer's Guide for Windows 2000
chapter 3 .

2.5.3 Determine the Outcome of the Call

Call Analysis가 vpm_dial() , Call

ATDX_CPTERM() .

ATDX_CPTERM() Call Analysis .

CR_NORB ? Call line busy

CR_BUSY ? Call line

CR_FAXTONE ? Call line fax machine modem

(PerfectCall Call Analysis가)

CR_NOANS ? Call line

CR_NODIALTONE ? Call line dial tone

CR_NORB ? Call line ring back signal

CR_STOPD ? Call Analysis가 vpm_stopch()

CR_ERROR ? Call Analysis error , ATDX_CPERROR()

, Call Analysis error type

3 가 Call Analysis 4 가 PerfectCall Call
Analysis .

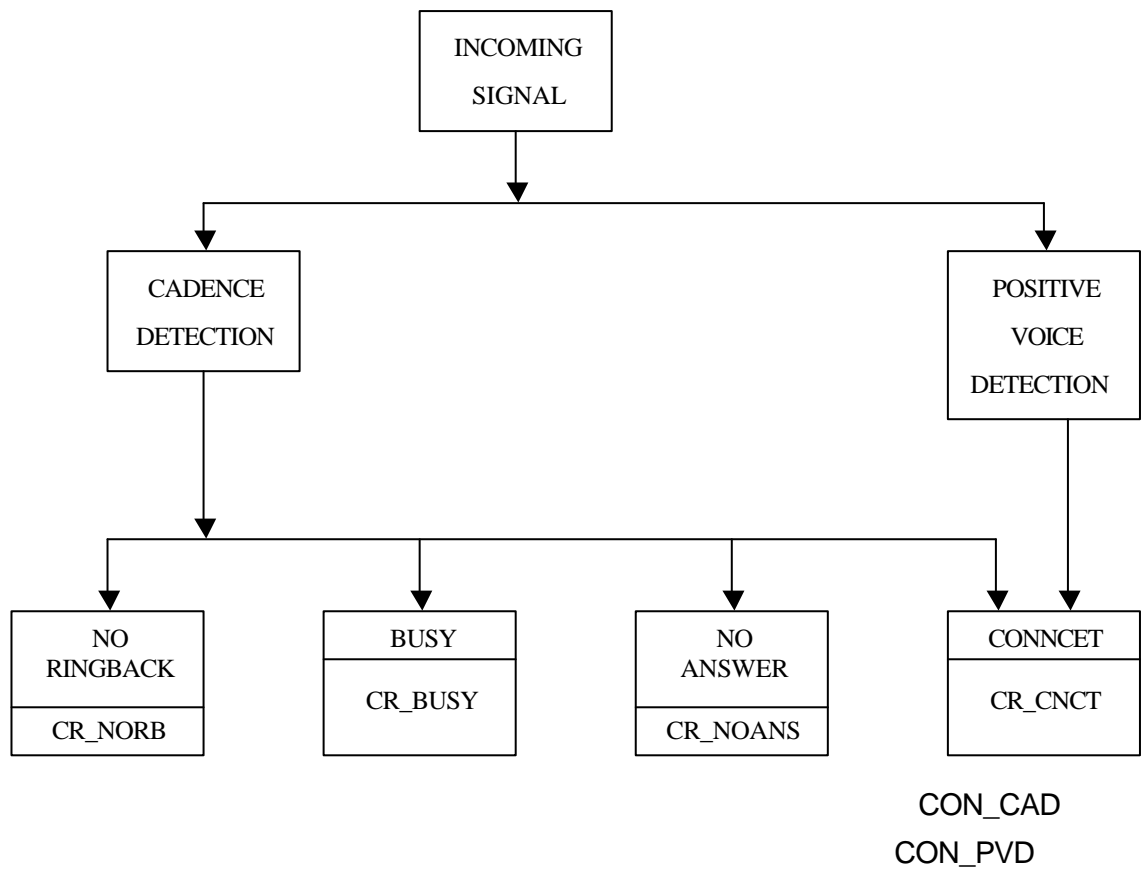


Figure 3. Call Analysis Outcomes for Basic Call Analysis

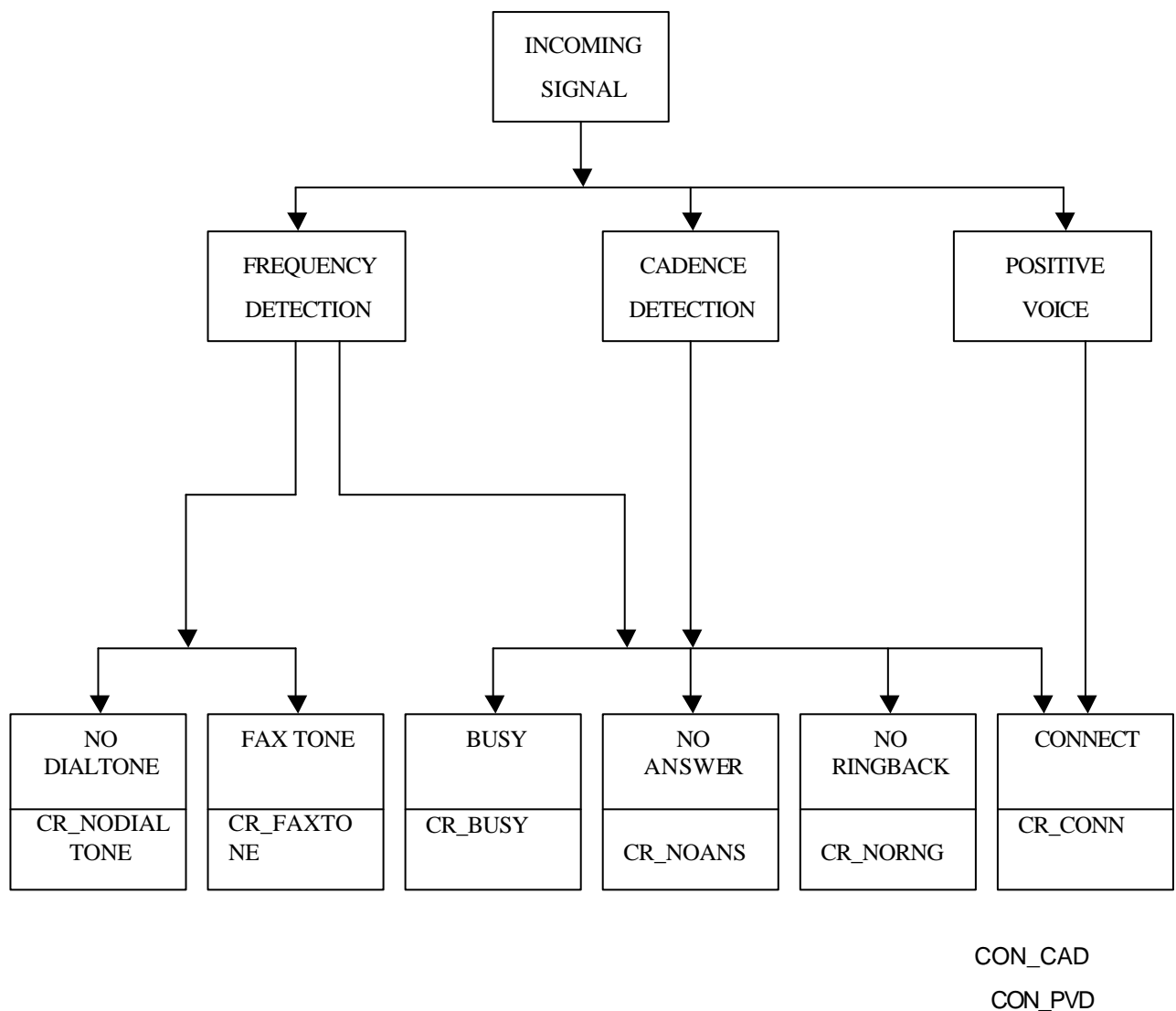


Figure 4. Call Analysis Outcomes for PerfectCall Call Analysis

2.5.4 Obtain Additional Call Outcomes Information

가 Call Analysis Extended Attribute ,

ATDX_ANSRSIZ ? duration
 ATDX_CPEROR ? Call Analysis error
 ATDX_CPTERM ? Call Analysis
 ATDX_CONNTYPE ? Connection type

ATDX_CRTNID	가	Call Analysis	tone
ATDX_DTNFAIL	가	Call Analysis	dial tone
ATDX_LONGLOW		duration	
ATDX_SHORTLOW		duration	
ATDX_SIZEHI		duration	
Extended Attribute		frequency	duration
DX_CAP parameter		2.6	

2.6 How the DX_CAP Controls Call Analysis

Frequency Detection, Cadence Detection, Positive Voice Detection, Positive Answering Machine Detection DX_CAP parameter .

Header file , DX_CAP structure Voice Programmer's Guide for Windows 2000 4 .

2.6.1 Cadence Detection in Basic Call Analysis

Cadence Detection Network .

Cadence Detection Call Progress Characterization(CPC) utility Basic Call Analysis .

PerfectCall Call Analysis Tone Detection in PerfectCall Call Analysis . CPC utility Basic Call Analysis PerfectCall Call Analysis Call Progress data .

System PBX type , Cadence Detection parameter , Cadence Detection system .

CPC utility Cadence Detection parameter .

Cadence Detection 가 Cadence Detection parameter . Cadence Detection parameter DX_CAP structure List Voice Programmer's Guide for Windows 2000

Cadence Detection ringback busy signal pattern , sound
 silence pattern . pattern audio cadence
 cadence가 , cadence parameter sound
 silence single ring, double ring, busy signal
 cadence pattern .

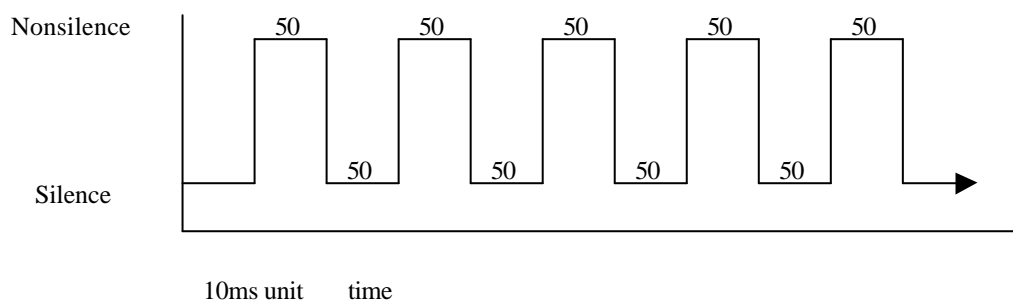


Figure 5. A Standard Busy Signal

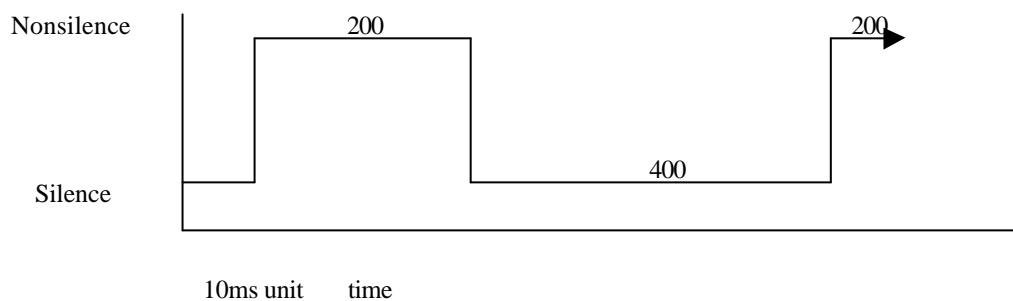


Figure 6. A Standard Single Ring

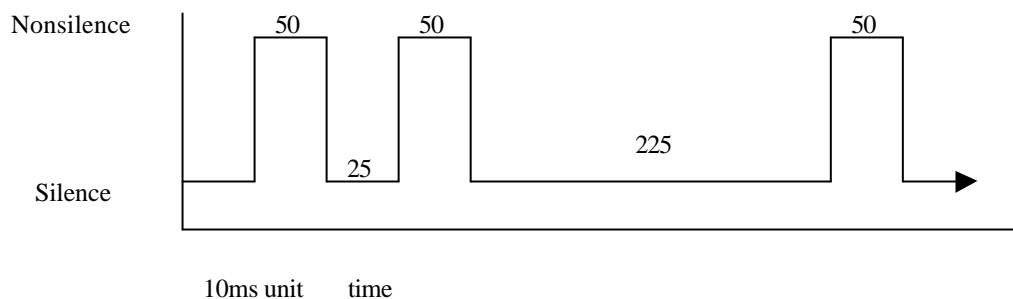


Figure 7. A Type of Double String

Elements of a Cadence

Cadence , Cadence double ring duration
가 2 silence period 가 , non silence
period 가 .
 , non silence period duration 가 .
type cadence , Voice Driver audio signal 2 silence
period 2 non silence period .

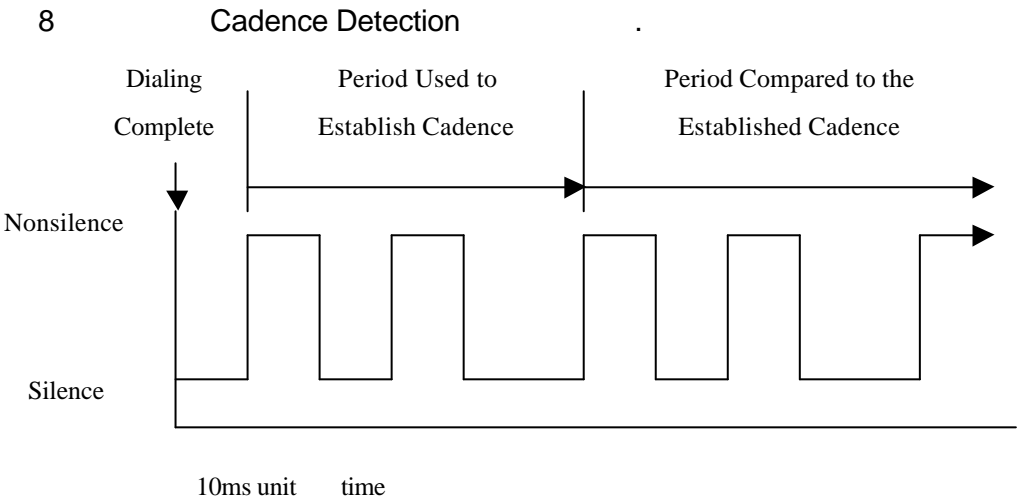


Figure8. Cadence Detection

Cadence가 , cadence value Extended Attribute function
.
ATDX_SIZEHI() Cadence 10ms unit nonsilence period
ATDX_SHORTLOW() Cadence 10ms unit 가 silence period
ATDX_LONGLOW() Cadence 10ms unit 가 silence period
Non Silence period duration 가 , cadence
non silence period .
9 cadence .

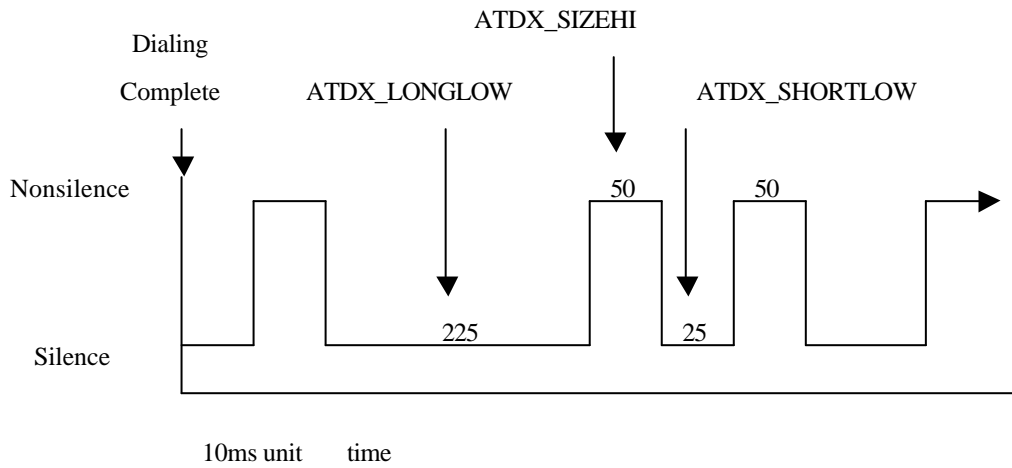


Figure9. Elements of Established Cadence

duration	cadence가 broken	field
Cadence Detection		
Cadence	Cadence가	Cadence
Detection		
? No Ringback		
? Connect		
? Busy		
? No Answer		
Positive Voice Detection	Connect	, Basic
Call Analysis	Cadence Detection	no ringback busy, no answer
Cadence		, Cadence Detection
No Ringback	Cadence가	, Cadence Detection signal
	silence non silence	

, Cadence Detection call 가
 , no ringback .

Connect Cadence가 , Cadence Detection busy ring back
 signal audio signal . , Cadence
 Detection cadence(ringback busy signal)가
 broken , connect .

Cadence가 Cadence Detection .

Connect Cadence가 , Cadence Detection cadence가
 audio signal . cadence가
 broken , connect .

No Answer Cadence가 , Cadence Detection cadence가
 single double ring . ring cadence가
 broken , No Answer .

Busy Cadence가 , Cadence Detection Busy signal
 . , busy cadence가
 , Cadence Detection busy .

Setting Selected Cadence Detection Parameters

가 Cadence Detection Parameter .
 Network (PBX system)
 Cadence Detection Parameter .

Call Progress Characterization Utility(CPC)가 Cadence detection parameter .

Call Progress Characterization General Cadence Detection Parameters

ca_stdely : Start Delay : dial Frequency Detection
 delay .
 Parameter Cadence Detection Positive Voice Detection

Default : 25(10ms unit)

parameter

parameter

switching transient

signal

Cadence Detection Parameter Affecting a No Ringback

Cadence Detection , non silence audio signal

ca_cnosig parameter

ca_cnosig silence가 , no ringback

(10)

line

system error

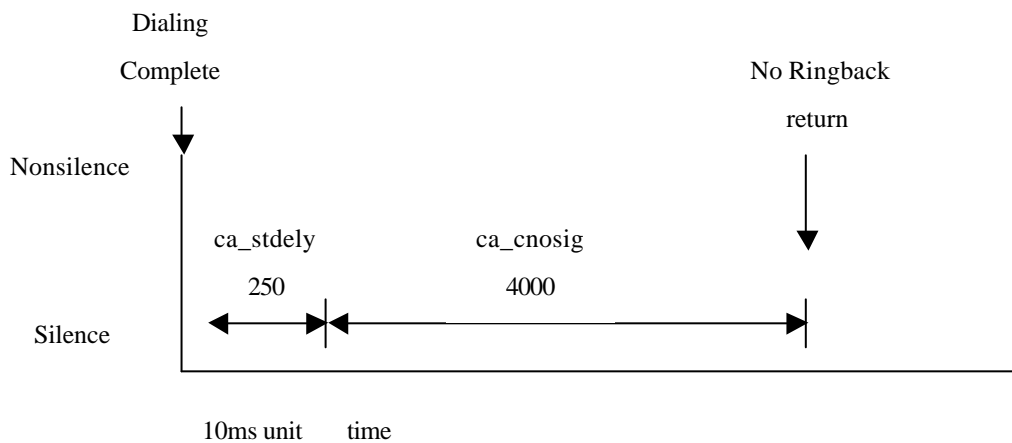


Figure10. No Ringback Due to Continuous No Signal

ca_cnosig Continuous no Signal : Cadence Detection

silence time

, no ringback

Default : 4000(10ms unit) 40

Cadence Detection Parameters Affecting a No Answer or Busy

ca_noanswer , ring

, No Answer

ca_noanswer ring answer

No Answer

Default : 3000(10ms unit) 30

Cadence Detection Parameters Affecting a Connect

Cadence Detection parameter 가

. 가 , 가

, answering machine

.

ATDX_ANSRSIZ() . ,

.

가 “ ” 1

. “ , ○ ○ ○ ○ ○ ○ ” 1.5

3 . Answering machine Computer 3-4 가 .

100% .

? .

? , connect event .

? Ring back tone 가 pick , ring back

, ATDX_ANSRSIZ() .

, ring , “ ”

, ring duration duration

. ATDX_ANSRSIZ() 0 1.8

가 .

word Call Analysis

, silence . ca_ansrdgl

parameter . parameter

, silence . ca_ansrdgl ,

50(10ms unit) .

ca_ansrdgl Answer Deglitcher : word silence.

parameter ,

Default : -1()

ca_maxansr Maximum Answer : ansrsize . ansrsize가
ca_maxansr , application connect가
Default : 1000(10ms unit) 10

11 ca_ansrdgl parameter가

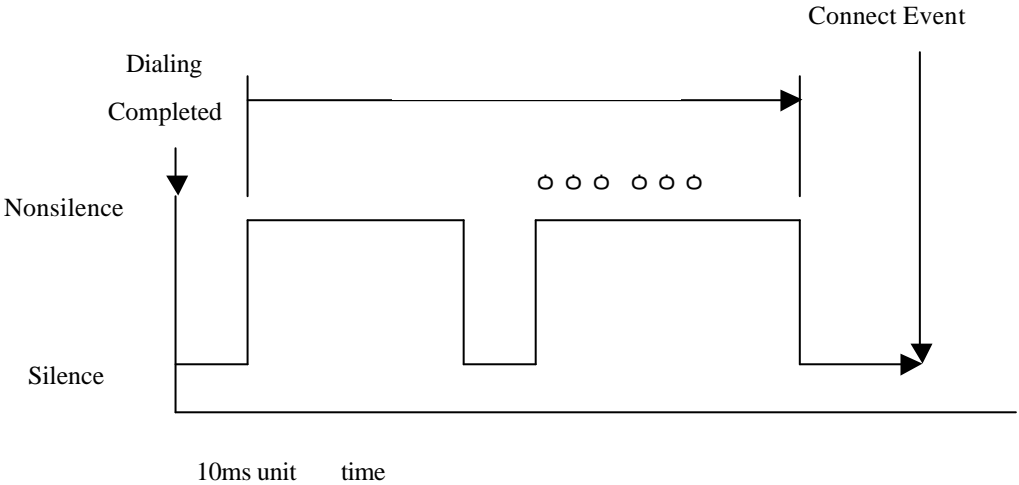


Figure11. Cadence Detection Salutation Processing

Call Analysis가 , ATDX_ANSRSIZ()
180(1.8)ms , 가 , 180 – 300
. 480 , answering
machine . 0 , connect excessive silence가

NOTE : connect가 Positive Voice Detection , DX_CAP parameter
ca_ansrdgl가 ca_maxansr

Cadence Information Returned Using Extended Attribute Functions

ATDX_SIZEHI() ? non-silence cadence duration
ATDX_SHORTLOW() ? shorter silence cadence duration
ATDX_LONGLOW() ? longer silence cadence duration
ATDX_ANSRSIZ() ? connect , answer duration

ATDX_CONNTYPE() ? ATDX_CONTYPE() CON_CAD , connect
cadence detection

2.6.2 Tone Detection in PerfectCall Call Analysis

PerfectCall Call Analysis Call Cadence Detection, Frequency
Detection signal . Cadence Detection sound
silence , Frequency Detection signal
Signal cadence frequency가 tone

Signal Cadence DX_CAP structure filed Basic
Call Analysis , PerfectCall Call Analysis Voice Driver
tone definition . tone definition default 가

Types of Tones

Tone Definition signal . list
tone tone . tone ATDX_CRTNID()

? TID_DIAL_LCL Local Dial Tone
? TID_DIAL_INTL International Dial Tone
? TID_DIAL_XTRA Special(extra) Dial Tone
? TID_BUSY1 Single tone busy signal
? TID_BUSY2 Dual tone busy signal
? TID_RNGBK1 Ringback tone
? TID_FAX1 A fax CNG tone
? TID_FAX2 A fax CED or modem tone

Tone vpm_chgfreq(), vpm_chgdur(), vpm_chgrepcnt()
tone definition . Voice Programmer's Guide
for Windows 2000 "How to Enable PerfectCall Call Analysis"

Dial Tone Detection

PerfectCall Call Analysis가 , Call dial string system
dial tone ASCII character .
가 character가 dial string .
L local dial tone

I international dial tone
X Special(extra) dial tone

dial tone tone definition vpm_initcallp()가 ,
channel . DX_CAP field dial tone
dialtone .

ca_dtn_pres Dial tone present : dial tone
(10ms unit). Dial tone , dial string
dial .
Default value : 100(1)

ca_dtn_npres Dial tone Not present : dial tone
. dial tone , Call
Analysis , CR_NODIALTONBE .
dial tone dial tone character(L,I,X) ATDX_DTNFAIL()
.
Default value : 300(3)

Tone Definition signal . list
tone tone . tone ATDX_CRTNID()

Ringback Detection

PerfectCall Call Analysis Call ringback , ringback
tone definition .
ring (ringback)timer가
. ringback cadence가 broken , call , Call
Analysis CR_CONN . ATDX_CONNTYPE()
connection type CON_CAD(cadence broken) .

DX_CAP field가 .

ca_stdely : Start Delay : dial Frequency Detection
delay .
Parameter Cadence Detection Positive Voice Detection
.
Default : 25(10ms unit)
parameter . parameter
switching transient ,

signal .

ca_cnosig Continuous no Signal : Cadence Detection
silence time , no ringback .
Default : 4000(10ms unit) 40

ca_noanswer ring answer .
No Answer
Default : 3000(10ms unit) 30

ca_maxinterring ringback signal ringback time
duration , Call Analysis CR_CONN
Default value :800(8)

Busy Tone Detection

PerfectCall Call Analysis TID_BUSY1, TID_BUSY2 2 busy tone
. Frequency Detection Cadence Detection 가
, Call Analysis CR_BUSY .
ATDX_CRTNID() , busy tone .

Fax or Modem Tone Detection

fax modem tone PerfectCall Call Analysis 가 .
fax modem tone TID_FAX1 TID_FAX2 tone
. Frequency Detection Cadence Detection fax tone 가 ,
Call Analysis CR_FAXTONE .
ATDX_CRTNID() fax modem tone .

2.6.3 Positive Voice Detection

Positive Voice Detection(PVD)
Call . ATDX_CONTYPE() 가
CON_PVD , Positive Voice Detection

3. General Tone Detection/Generation

3.1 General Tone Detection/Generation Overview

General Tone Detection(GTD) General Tone Generation(GTG)

. GTD GTG single dual frequency tone

General Tone Detection General Tone Generation Voice
Programmer's Guide for Windows 2000 chapter 2

NOTE: General Tone Detection Call Analysis chapter 3

General Tone Detection가 General Tone Generation Voice Board

3.2 General Tone Detection(GTD)

General Tone Detection user가 가 tone

, 가 tone

tone GTD tone template . tone template 가

frequency cadence component parameter 가

single dual frequency tone sound GTD tone template

GTD channel , channel off hook . GTD

DTMF detection

Library tone event queue digit queue , tone event

digit . GTD tone Configuration

Tone template access single dual frequency tone detection

가 GTD

tone DTMF tone tone

3.2.1 Defining GTD Tones

GTD tone vpm_addtone() digit dig type parameter ,

ASCII digit . tone , digit DV_DIGIT buffer

, vpm_getdig() , digit

tone , tone tone event digit I/O

DV_TPT data structure . DV_TPT structure
Voice Programmer's Guide for Windows 2000 Appendix A

NOTE : tone(digit) I/O ,
DV_TPT data structure

3.2.2 Building Tone Templates

Tone Template ,
? single dual frequency(300-3500 Hz)
? tone template , 가 ASCII digit
? Cadence Components

Channel tone template , channel tone 가
tone template , tone
channel tone template 가 . tone
, tone template

NOTE : tone template .
tone template channel . tone
channel tone .
가 tone template

?

? **vpm_bldst()** build a single frequency tone description
? **vpm_blddt()** build a dual frequency tone description
? **vpm_bldstcad()** build a single frequency tone cadence description
? **vpm_blddtcad()** build a dual frequency tone cadence description
? **vpm_setgtdamp()** set the GTD amplitude

NOTE : 1. GTD build tone template . vpm_addtone()

channel tone template .

2. Channel tone template vpm_addtone()

3. vpm_bld...() tone template , tone
template vpm_addtone()

vpm_bldst() single frequency tone .

vpm_addtone() , tone tone .

tone template channel tone

.

vpm_blddt() dual frequency tone .

vpm_addtone() , tone tone .

tone template channel tone

.

vpm_bldstcad() single frequency cadence tone .

vpm_addtone() , tone tone

tone template channel

tone . Single frequency cadence tone on/off 가 single

frequency signal 가 .

vpm_blddtcad() dual frequency cadence tone .

vpm_addtone() , tone tone .

tone template channel tone

. Dual frequency cadence tone on/off 가 dual frequency

signal 가 .

Cadence Detection on/off time 40ms on, 40ms off .

table Bell System Network Call Progress Tones

. template frequency tone template

Tone	Frequency(Hz)	On Time(ms)	Off Time(ms)
Dial	350+440	Continuous	
Busy	480+620	500	500
Congestion(Toll)	480+620	200	300
Reorder(Local)	440+620	300	200
Ringback	440+480	2000	4000

3.2.3 Working with Tone Templates

Tone tone detection

- ? vpm_addtone() add a tone template
- ? vpm_deltone() delete tone templates

? **vpm_distone()** disable detection of a tone
 ? **vpm_enbtone()** enable detection of a tone

vpm_addtone() channel GTD build tone , 가
 tone template .
 tone template tone template board download
 , tone template tone-on, tone-off event .

- : 1. tone template 가 .
- 2. tone template vpm_addtone()
 , error가 .

vpm_deltone() vpm_addtone() tone
 . channel tone ,

NOTE : vpm_deltone() build tone template , tone
 tone template .
 PerfectCall Call Analysis tone tone

vpm_distone() channel DX_TONEON, DX_TONEOFF event

User Defined Tone channel vpm_addtone()
 가 .

vpm_addtone() channel DX_TONEON, DX_TONEOFF event

User Defined Tone channel vpm_addtone()
 가 . vpm_distone() tone

GTD tone vpm_addtone() digit dig type parameter ,
 ASCII Digit . tone , digit DV_DIGIT buffer
 , vpm_getdig() , digit .

3.2.4 Tone Event Retrieval

Event
1. tone-on/off 가 vpm_addtone() vpm_enbtone()

2. CST event , vpm_getevt() . event DX_EBLK
 structure .

NOTE : Procedure CST event .
 event 가 , vpm_setevtmask()
 vpm_addtone() vpm_enbtone() .

 가 tone template ASCII digit(digit type) .
 tone template DTMF tone . digit ,
 digit buffer , I/O . tone
ASCII digit , tone tone event가 .

3.2.5 Maximum Number of Tone Template

 tone template guide line table
 .

Table. Maximum Memory and Tone Templates(for Dual Tones)

Hardware	Tone Templates
VPM400	8
VPM800	8
VPM1600	8

3.2.6 Applications

Global Tone Detection sample application .
 application disconnect가 fast-busy signal
GTD가 가 .

Disconnect Supervision

General Tone Detection disconnect . call
 , Central Office disconnect Loop Current
 drop . PBX drop disconnect
 fast busy signal . General Tone Detection busy signal
 .
 signal
 1. Single Frequency .
 2. on/off duration cadence .
 3. Cadence 가 single dual frequency tone template build tone
 function .
 4. General Tone Detection vpm_adtone() GTD
 template .

3.3 General Tone Generation

General Tone Generation User Defined tone . Tone
 Generation template(TN_GEN) 가 tone .
 ? Single or dual tone
 ? Frequency fields
 ? Amplitude for each frequency
 ? Duration of tone

3.3.1 General Tone Generation Functions

 가 tone .
 ? vpm_bldtngen() : tone generation template
 ? vpm_playtone() : Play a tone
 vpm_bldtngen() tone generation template structure field
 Convenience function .
 Tone generation template return buffer , vpm_playtone()
 tone .
 vpm_playtone() tone generation template tone play .
 DV_TPT structure .
 ATDX_TERMMSK() . vpm_playtone() 0 .

3.3.2 Building and Implementing a Tone Generation Template

Tone generation template play single dual frequency tone frequency,
 amplitude, duration . structure vpm_bldtngen()

. tone play , vpm_playtone() .

TN_GEN data structure .

```
typedef struct {
    unsigned short tg_dflag; /* dual tone - 1, single tone - 0 */
    unsigned short tg_freq1; /* frequency of tone 1 (in Hz) */
    unsigned short tg_freq2; /* frequency of tone 2 (in Hz) */
    short int tg_ampl1; /* amplitude of tone 1 (in dB) */
    short int tg_ampl2; /* amplitude of tone 2 (in dB) */
    short int tg_dur; /* duration (in 10 ms) */
} TN_GEN;
```

TN_GEN data structure , tone template

가 .

1. structure .
- 2 . vpm_bldtnngen() , TN_GEN structure value

Template , tone play TN_GEN vpm_playtone() .

Structure , tone template structure .

vpm_playtone() , structure

. template 가 ,

structure .

4. Speed and Volume Control

4.1 Speed and Volume Control Overview

play-speed play-volume

4.2 Voice Software Speed and Volume Support

Speed Volume VPM400, VPM800,VPM1600 . Voice
Software play channel speed volume data structure
가 .

end user가 DTMF Speed Volume

NOTE : Speed ADPCM 32k data . Volume encoding
algorithm Play .

4.2.1. Speed and Volume Convenience Functions

Convenience function Speed Volume digit .
data structure . convenience function Speed Volume
Modification table default setting .
Modification table 가 .
Speed Volume convenience function .
? **vpm_addspddig()** – speed digit .
? **vpm_addvoldig()** – volume digit .

4.2.2. Speed and Volume Adjustment Functions

Speed Volume digit
keypad “1” ,
가 . Speed Volume
.
? **vpm_setsvcond()** – Speed Volume . DTMF digit
Speed Volume , Play
.
? **vpm_adjsv()** – Speed Volume . Adjustment condition digit
play , Application
 , Keyboard key .

Voice Programmer’s Guide for Windows 2000

chapter 3

4.2.3. Speed and Volume Modification Tables

channel play speed play volume Speed Volume
Modification Table 가 . Setting , table Speed
Volume . Speed Volume Modification table 21 entry
가 , 20 entry Speed Volume 10 가 10
가 entry . table 가 entry normal speed volume
original entry . Normal Speed Volume Speed Volume control
feature가 , Play 가 .
Normal Speed Volume table .
0 . normal speed volume table .
Speed Volume table 가
.
Table entry normal , deviation Speed
Volume .
Original normal speed volume , original
. SVMT normal
speed volume deviation .
Speed Volume control table Speed Volume pointer SVMT
table entry 가 .
Speed Volume 가 , table entry
.
Speed Volume system
reset .
Speed Volume Modification table DX_SVMT structure
vpm_setsvmt() reset . table
vpm_getsvmt() DX_SVMT data structure .
DX_SVCB data structure .
DX_SVCB data structure adjustment condition , table .
DX_SVMT data structure DX_SVCB data structure Voice Programmer's Guide for
Windows 2000 chapter 4 .
Speed Volume Speed Volume Modification table ,
vpm_adjsv() vpm_setsvcond() . Speed

Volume

? level(speed table volume table)

? level (speed volume table step

)

:

, Volume Modification Table , entry original value 2 decibel

가 . Volume position 1 1step

2 decibel

Table Speed Modification Table table entry default play

speed percentage deviation

, decrease[6] position 40%

Table. Speed Modification Table

Table Entry	Default Value	Absolute Position
decrease[0]	-128(80h)	-10
decrease[1]	-128(80h)	-9
decrease[2]	-128(80h)	-8
decrease[3]	-128(80h)	-7
decrease[4]	-128(80h)	-6
decrease[5]	-128(80h)	-5
decrease[6]	-128(80h)	-4
decrease[7]	-128(80h)	-3
decrease[8]	-50	-2
decrease[9]	-25	-1
origin		0
increase[0]	+25	1
increase[1]	+50	2
increase[2]	+75	3
increase[3]	+100	4
? ?	?	?
? ?	?	?
increase[9]	-128	10

NOTE : table , 가 position decrease[5] .
 field -128(80h) . position
 , default action decrease[5] speed play .
 -50 , field reset .
NOTE : Speed 25 -50,-25,+25,+50,+75,+100 가

Table Volume Modification Table table entry starting
 point original volume deviation .
 , increase[1] position volume 4db 가 . original
 2 가 가 .

Table. Speed Modification Table

Table Entry	Default Value(db)	Absolute Position
decrease[0]	-128	-10
decrease[1]	-128	-9
decrease[2]	-128	-8
decrease[3]	-128	-7
decrease[4]	-128	-6
decrease[5]	-128	-5
decrease[6]	-40	-4
decrease[7]	-30	-3
decrease[8]	-20	-2
decrease[9]	-10	-1
origin	0	0
increase[0]	+05	1
increase[1]	+10	2
increase[2]	+15	3
increase[3]	+20	4
increase[4]	-128	5
increase[5]	-128	6
? ?	?	?
? ?	?	?

increase[9] -128 10
NOTE : table , 가 position increase[4] . 가
 field -128(80h) . position
 , default action increase[4] volume play .
 +10 volume , field reset .
NOTE: Volume 20 dB -40 DB dB 가 가 .

Speed Volume digit
 keypad “1” ,
 가 . Speed Volume
 .
 ? **vpm_setsvcond()** – Speed Volume . DTMF digit
 Speed Volume , Play
 .
 ? **vpm_adjsv()** – Speed Volume . Adjustment condition digit
 play . , Application

4.2.4. Play Adjustment Digits

Voice Software Play adjustment digit normal digit .
 ? play play adjustment digit , play ,
 . digit digit queue ,
 vpm_getdit() vpm_getdigbuf() ,
 termination .
 ? Play 가 , Play level sensitive , digit queue
 adjustment digit , digit Speed Volume ,
 queue .

4.3 Using Speed and Volume Control

- ? Setting play adjustment conditions
- ? Adjusting play explicitly

4.3.1 Setting Adjustment Conditions

Speed Volume . step Volume

1. Volume Modification Table .

? Table Step size number DX_SVMT structure

? Volume Modification Table DX_SVMT structure 가

vpm_setsvmt .

(vpm_setsvmt() table reset .)

2. size type DX_SVCB .

3. DX_SVCB structure 가 vpm_setsvcond() . array

play volume .

vpm_setsvcond() vpm_setsvmt() Voice Programmer's Guide for
Windows 2000 chapter 3 , DX_SVCB structure Voice
Programmer's Guide for Windows 2000 chapter 4 .

4.3.2 Explicitly Adjusting Speed and Volume

Speed Volume . Speed

step . Procedure Volume

1. Speed Modification Table .(default)

? Table step size number DX_SVMT structure

? Speed Modification Table DX_SVMT structure 가

vpm_setsvmt() .

2. size type , Speed Modification Table

vpm_dial() .

vpm_adjsv() vpm_setsvmt() Voice Programmer's Guide for
Windows 2000 chapter 3 , DX_SVMT structure Voice
Programmer's Guide for Windows 2000 chapter 4 .

5. Voice Features Demonstration Programs

demo program instruction .

5.1 Multithreaded GUI Based Voice Features Application Program

Multithreaded GUI Based Application Program Windows 2000

channel SCT Voice Device GUI demo program .

file <install drive>:\<install directory>\SCT\samples\voice. .

Multithreaded GUI Based Application Program Windows Programming

Voice application API function .

Small Windows Program Code Graphical user

interface .

Multithreaded GUI Based Application Program

?Set hook state

?Play VOX and WAV files

?Adjust playback volume

?Record to VOX and WAV files

?Play a user defined tone

?Make a call with or without PerfectCall

?Wait for digits

Multithreaded GUI Based Application Program thread .

main thread() open voice device child window

main thread Voice Device Voice function()

. thread child window message , device가

busy , child menu gray .

thread device event sr_waitvt() polling .event가

, message가 child window , menu item

Option Menu Perfect Call option Play tone ,

wave recording option .

, CHINFO structure . device가 open ,

CHINFO structure default .

Call Analysis Public Switched Telephone Network(PSTN) dial call

monitor . Call Analysis Basic Call Analysis

PerfectCall Call Analysis가 .

5.2 Running Multithreaded GUI Based Application Program for Voice Boards

Voice Board Multithreaded GUI Based Application Program

1. SCT voice board PBX .
2. SCT start program SCT board .

Voice Board Multithreaded GUI Based Application Program

:

1. SCT package Multithread GUI Based Application icon .
2. FILE menu open .
3. channel(vpmBxCx) open ok .
- open /
4. Function Menu off hook .

Function Menu , option

menu operation .

Appendix A

Related Voice Publications

Voice Publications Overview

Voice hardware software

Voice Publications Listing

? SCbus Routing Function Reference for Windows 2000

? Voice Programmer's Guide for Windows 2000

? Standard Runtime Library Programmer's Guide for Windows 2000