



Continuous Speech Processing API for Linux and Windows Operating Systems

Demo Guide

November 2003



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Revision History

This revision history summarizes the changes made in each published version of this document.

Document No.	Publication Date	Description of Revisions
05-1701-003	November 2003	Global change: The CSP demos (Linux and Windows, DM3 and Springware versions) have been integrated into new demos called CSPLive and CSPAuto. Demo Description chapter: Updated with CSPLive and CSPAuto demo descriptions. Running the Demo chapter: Rewritten to describe the CSPLive and CSPAuto demos. Demo Details chapter: Updated list of files used by the new CSP demos.
05-1701-002	September 2002	Preparing to Run the Demo chapter: Added new steps. Running the Demo chapter: Added new streaming/recording over TDM bus option.
05-1701-001	December 2001	Initial version of document.



About This Publication

The following topics provide information about this publication:

- [Purpose](#)
- [Intended Audience](#)
- [How to Use This Publication](#)
- [Related Information](#)

Purpose

This publication describes the Continuous Speech Processing demonstration programs and provides instructions for running the demos.

Intended Audience

This publication is written for the following audience:

- Distributors
- System Integrators
- Toolkit Developers
- Independent Software Vendors (ISVs)
- Value Added Resellers (VARs)
- Original Equipment Manufacturers (OEMs)

How to Use This Publication

Refer to this publication after you have installed the hardware and the system software which includes the Continuous Speech Processing software.

This publication assumes that you understand computer telephony terms and concepts, and are familiar with the Linux* or Windows* operating system and the C programming language.

The information in this guide is organized as follows:

- [Chapter 1, “Demo Description”](#) provides a brief overview of the Continuous Speech Processing demos.
- [Chapter 2, “System Requirements”](#) discusses the hardware and software required to run the demos.

- [Chapter 3, “Preparing to Run the Demo”](#) lists the procedures you must follow before running the demos.
- [Chapter 4, “Running the Demo”](#) describes the steps to run the demos, the demo options, and how to stop the demo.
- [Chapter 5, “Demo Details”](#) provides additional information about the demos, such as the files used by the demos.

Related Information

See the following for more information:

- For information about Continuous Speech Processing library features and guidelines for building applications using CSP software, see the *Continuous Speech Processing API Programming Guide*.
- For details on all functions and parameters in the Continuous Speech Processing library, see the *Continuous Speech Processing API Library Reference*.
- For information about Voice library features and guidelines for building applications using Voice software, see the *Voice API Programming Guide*.
- For details on all voice functions, parameters, and data structures in the Voice library, see the *Voice API Library Reference*.
- For details on the Standard Runtime Library (a device-independent library that consists of event management functions and standard attribute functions), supported programming models, and programming guidelines for building all applications, see the *Standard Runtime Library API Programming Guide*.
- For details on all functions and data structures in the Standard Runtime Library library, see the *Standard Runtime Library API Library Reference*.
- For information on the system release, system requirements, software and hardware features, supported hardware, and release documentation, see the Release Guide.
- For details on compatibility issues, restrictions and limitations, known problems, and late-breaking updates or corrections to the release documentation, see the Release Update (available on the Technical Support Web site only).
- For details on installing the system software, see the *System Release Installation Guide*.
- For guidelines on building applications using Global Call software (a common signaling interface for network-enabled applications, regardless of the signaling protocol needed to connect to the local telephone network), see the *Global Call API Programming Guide*.
- For details on all functions and data structures in the Global Call library, see the *Global Call API Library Reference*.
- For details on configuration files (including FCD/PCD files) and instructions for configuring products, see the Configuration Guide for your product or product family.
- For technical support, see <http://developer.intel.com/design/telecom/support/>. This Technical Support Web site contains developer support information, downloads, release documentation, technical notes, application notes, a user discussion forum, and more.

This chapter provides a brief description of the Continuous Speech Processing demonstration programs.

Two Continuous Speech Processing demos are provided. These demos support DM3 and Springware boards. They illustrate key product features such as barge-in, voice activity detection, and echo-cancelled recording.

The two Continuous Speech Processing demo programs are as follows:

CSPLive demo

A multi-channel, interactive demo that can be run in one of two modes: interactive or diagnostic. The CSPLive demo also performs board discovery to detect the hardware in use, such as analog, E1, or T1 board.

- interactive mode – illustrates the operation of the **ec_reciottdata()** function or the **ec_stream()** function. This mode allows you to listen to a prompt, interrupt (barge-in) and stop the prompt, and start recording a message with echo cancellation.
- diagnostic mode – used to verify operation of parameters that are available with the **ec_setparm()** function.

CSPAUTO demo

A multi-channel, non-interactive demo that can be run in two modes:

- automatic mode – illustrates the operation of the **ec_reciottdata()** function. This mode uses the number of CSP channels you specify. Channels are paired, with one channel playing an outgoing prompt (the channel being tested) while the other partner channel plays a barge-in prompt (the stimulus channel).
- diagnostic mode – used to verify operation of parameters that are available with the **ec_setparm()** function.

Source code for each demo is provided.



The requirements for running the Continuous Speech Processing demos are described in the following sections:

- [Hardware Requirements](#) 11
- [Software Requirements](#) 11

2.1 Hardware Requirements

To run the CSPLive demo, you need:

- One CSP-enabled board configured as the first board in the system.
- A stimulus application to simulate calls to the demo.

OR

- For boards with a digital network interface, a T1 or an E1 line connected to your system. For boards with an analog interface, an analog line such as a connection to a PBX.

To run the CSPAuto demo, you need:

- One CSP-enabled board configured as the first board in the system.

For other system configuration requirements, such as memory requirements, see the Release Guide for your system release.

2.2 Software Requirements

To run the CSP demos, you need the Intel® Dialogic® System Release with Continuous Speech Processing software. Be sure to select the Demos component when installing the system release.

Note: To run the CSPLive demo, you also need to install Global Call Protocols 4.0 or later. For a copy of the Global Call Protocols, see the Intel Telecom Support Resources web site at: <http://resource.intel.com/telecom/support/download/>

For a list of operating system requirements and supported compilers, see the Release Guide for your system release.



This chapter provides information on preparations to follow before running a Continuous Speech Processing demo.

Before running a CSP demo, take care to follow these procedures:

1. Adhere to the hardware and software requirements listed in [Chapter 2, “System Requirements”](#).
2. Ensure that Intel[®] Dialogic[®] System Service has been started for your board. In addition, make sure that the firmware (for Springware boards) or the media load (for DM3 boards) supports CSP. See the Installation Guide for more information on installing the software and starting the boards. See the Configuration Guide for DM3 products for information on media loads.
3. Run a CSP demo on one type of board at a time. If you have several types of boards in your system (such as analog and digital boards, Springware and DM3 boards), you must start Intel Dialogic System Service only on the board(s) for which you are running the demo. In Windows, you must disable Intel Dialogic System Service on all other boards. In Linux, perform download only on the board to be used for the CSP demo.
4. Be sure to download the appropriate firmware file that supports CSP. For information on media load files (firmware files) on DM3, see the Configuration Guide for DM3 products.



Information on running the Continuous Speech Processing demos is provided in the following sections:

- [Starting the Demo](#) 15
- [Demo Options](#) 16
- [Using the Demo](#) 19
- [Stopping the Demo](#) 22

4.1 Starting the Demo

The following sections provide information on starting the Continuous Speech Processing demos:

- [Starting the CSPLive Demo](#)
- [Starting the CSPAuto Demo](#)

4.1.1 Starting the CSPLive Demo

To run the CSPLive demo, which is located by default in *\program files\dialogic\demos\speechprocessing\CSPLive*, follow these instructions:

1. Open a command prompt window and go to the directory where the demo is located.

2. At the command prompt, type

```
csplive -<option>
```

For help on demo options, type

```
csplive -?
```

The demo options are described in [Table 1, “CSPLive Demo Options”](#), on page 16. If you don't specify an option, default options are assumed.

4.1.2 Starting the CSPAuto Demo

To run the CSPAuto demo, which is located by default in *\program files\dialogic\demos\speechprocessing\CSPAuto*, follow these instructions:

1. Open a command prompt window and go to the directory where the demo is located.

2. At the command prompt, type

```
cspauto -<option>
```

For help on demo options, type

```
cspauto -?
```

The demo options are described in [Table 2, “CSPAuto Demo Options”](#), on page 18. If you don’t specify an option, default options are assumed.

4.2 Demo Options

The following sections provide information on the Continuous Speech Processing demo options:

- [CSPLive Demo Options](#)
- [CSPAuto Demo Options](#)

4.2.1 CSPLive Demo Options

For the CSPLive demo, the format for specifying options at the command prompt is:

```
csplive -<option> -<option> (and so on)
```

Table 1 illustrates options for the CSPLive demo. These options are specified from the command line. If an option is not specified when running a CSP demo, a default value applies.

For detailed information on functions and parameters mentioned in the table, see the *Continuous Speech Processing API Library Reference*.

- Notes:**
1. The order in which you specify demo options is not important.
 2. In the table, N represents an integer and () represents an optional value.

Table 1. CSPLive Demo Options

Demo Option	Default Value	Description/Value
-?	none	Displays help.
-cN	-c1	Specifies the number of interactive channels to use. The channels are incremented based on the starting channel that is specified with the -s option.
-d	disabled	Enables diagnostic mode. In this mode, the demo tests the parameters available in <code>ec_setparm()</code> . After the tests are completed, the demo resets all values to their original setting. The default value is diagnostic mode disabled.

Table 1. CSPLive Demo Options (Continued)

Demo Option	Default Value	Description/Value
-hN	-h-40	Specifies the speech threshold value while a prompt is playing. This option allows you to change the value in DXCH_SPEECHPLAYTHRESH, a parameter of <code>ec_setparm()</code> , from the default. The default value is -40 dBm. The range is +3 to -54 dBm. Note: You must supply the plus or minus sign with this value. If background noise level is high and triggers the voice activity detector erroneously, you can set the speech threshold to a higher value, such as -20 dBm.
-l(filename)	disabled	Enables logging of results to a text file in the directory from which you ran the demo (diagnostic mode only). If you don't specify a log file name, the default file name is <i>CSPLive.log</i> . To specify a different name such as <i>test.log</i> , enter <code>csplive -ltest.log</code> . The default value is logging disabled.
-p		Used to override the default Global Call protocol. To see the default protocol in use for a board, enter <code>csplive -?</code> at the command line.
-r	disabled	Specifies the use of either the <code>ec_reciottdata()</code> function or the <code>ec_stream()</code> function in the demo run. Specifying -r illustrates the use of the <code>ec_reciottdata()</code> function. Not specifying -r illustrates the use of the <code>ec_stream()</code> function, which is the default setting.
-sN	-s1	Enables selection of the starting voice channel. The default is that the demo runs on the first channel of the first board. You can use this option to specify any channel of any CSP-enabled board in your system. Note: Selecting a channel on an unsupported board results in a demo failure.

4.2.2 CSPAuto Demo Options

For the CSPAuto demo, the format for specifying options at the command prompt is:

```
csauto -<option> -<option> (and so on)
```

Table 2 illustrates options for the CSPAuto demo. These options are specified from the command line. If an option is not specified when running a CSP demo, a default value applies.

For detailed information on functions and parameters mentioned in the table, see the *Continuous Speech Processing API Library Reference*.

- Notes:**
1. The order in which you specify demo options is not important.
 2. In the table, N represents an integer and () represents an optional value.

Table 2. CSPAuto Demo Options

Demo Option	Default Value	Description/Value
-?	none	Displays help.
-a	disabled	Specifies a board with an analog interface. Note: The options -a, -e and -t are mutually exclusive.
-cN	-c2	Specifies the number of channels to use in automatic mode. Enter an even number, as channels are paired. If you enter an odd number, the demo reduces that number to an even number. For example, if you enter 7, the demo revises that number to 6. Note: This value is ignored for diagnostic mode. See -d option for information on setting diagnostic mode.
-d	disabled	Enables diagnostic mode. In this mode, the demo tests the parameters available in <code>ec_setparm()</code> . After the tests are completed, the demo resets all values to their original setting. The default value is diagnostic mode disabled.
-e	disabled	Specifies an E1 board. The protocol used is A and B bits set to 1 for off-hook and 0 for on-hook. Bits C and D are ignored. Note: The options -a, -e and -t are mutually exclusive.
-hN	-h-40	Specifies the speech threshold value while a prompt is playing. This option allows you to change the value in <code>DXCH_SPEECHPLAYTHRESH</code> , a parameter of <code>ec_setparm()</code> , from the default. The default value is -40 dBm. The range is +3 to -54 dBm. Note: You must supply the plus or minus sign with this value. Note: This value is ignored for diagnostic mode. If background noise level is high and triggers the voice activity detector erroneously, you can set the speech threshold to a higher value, such as -20 dBm.
-iN	-i2	Specifies the number of iterations. For a simple test, you can specify 1. For a longevity test, you can specify 2 or more. Note: This value is ignored for diagnostic mode.
-l(filename)	disabled	Enables logging of results to a text file in the directory from which you ran the demo. If you don't specify a log file name, the default file name is <code>CSPAuto.log</code> . To specify a different name such as <code>test.log</code> , enter <code>cspauto -ltest.log</code> . The default value is logging disabled.

Table 2. CSPAuto Demo Options (Continued)

Demo Option	Default Value	Description/Value
-sN	-s1	<p>Enables selection of the starting voice channel.</p> <p>The default is that the demo runs on the first channel of the first board. You can use this option to specify any channel of any CSP-enabled board in your system.</p> <p>Be aware of the following usage notes:</p> <ul style="list-style-type: none"> • Specify an odd number for the starting channel (channels are paired). If you enter an even number, the demo reduces it to an odd number. • This option is ignored for the diagnostic mode. • Selecting a channel on an unsupported board results in a demo failure.
-t	enabled	<p>Specifies a T1 board.</p> <p>The protocol used is Ear & Mouth (E&M) where A and B bits are set to 1 for off-hook and 0 for on-hook. Bits C and D are ignored.</p> <p>Note: The options -a, -e and -t are mutually exclusive.</p>

4.3 Using the Demo

The following topics provide information on using the Continuous Speech Processing demos:

- [Using the CSPLive Demo \(Interactive Mode\)](#)
- [Using the CSPLive Demo \(Diagnostic Mode\)](#)
- [Using the CSPAuto Demo \(Automatic Mode\)](#)
- [Using the CSPAuto Demo \(Diagnostic Mode\)](#)

4.3.1 Using the CSPLive Demo (Interactive Mode)

The CSPLive demo is a multi-channel demo that can be run in either interactive mode or diagnostic mode.

In interactive mode, the CSPLive demo illustrates the operation of the `ec_reciottdata()` function or the `ec_stream()` function.

Note: Be sure that the proper media load (DM3 boards) or firmware file (Springware boards) is downloaded to the board.

The CSPLive demo runs as follows:

1. After the demo starts, it waits for an incoming call.
2. Once the demo answers the call, the welcome prompt, *Welcome.pcm*, is played.
3. You can interrupt or barge in on the prompt as it is playing. As soon as you speak, the prompt stops playing and echo-cancelled recording begins. TDX_BARGEIN and TEC_VAD events are generated. The demo records your message for a few seconds and stores the message in

rec_xxx.pcm, where *xxx* represents the channel number. At the end of this time, the `TEC_STREAM` event is generated to indicate termination of recording.

The demo then plays back the echo-cancelled recording of your message.

4. The demo waits up to 45 seconds for the next action or event. If no further action or event is received, the demo is completed.

Example 1

To run the CSPLive demo with the `ec_stream()` function, type:

```
csplive
```

Example 2

To run the CSPLive demo with the `ec_reciottdata()` function, type:

```
csplive -r
```

4.3.2 Using the CSPLive Demo (Diagnostic Mode)

The CSPLive demo is a multi-channel demo that can be run in either interactive mode or diagnostic mode.

In diagnostic mode, this demo can be used to verify operation of parameters available through `ec_setparm()`. The demo alternatively sets each parameter to the minimum value and maximum value, and returns the appropriate message. After the demo is completed, the parameters are reset to their default values (see demo source code). For detailed information on CSP functions and parameters, see the *Continuous Speech Processing API Library Reference*.

To save the results of the demo run in a log file, use the `-l` option.

Example

To run the CSPLive demo in diagnostic mode, type:

```
csplive -d -l<log name>
```

For example, to run a test and log the results in *dmtest.log* file, type:

```
csplive -d -ldmtest.log
```

4.3.3 Using the CSPAuto Demo (Automatic Mode)

The CSPAuto demo is a multi-channel, non-interactive demo that can be run in either automatic mode or diagnostic mode.

In automatic mode, the demo uses the number of CSP channels you specify. Channels are paired, with one channel playing an outgoing prompt (the channel being tested) while the other partner channel plays a barge-in prompt (the stimulus channel).

For example, Channel 1 is paired with Channel 2. Channel 2 plays a prompt. Channel 1 waits one second and plays its own prompt to simulate barge-in. Channel 2 detects the barge-in, stops its prompt, and begins echo-cancelled recording. After each iteration, the two partner channels change roles. Therefore, to test all CSP channels, you must run at least two iterations (two loops). This mode uses `ec_reciottdata()`.

Example

To run the CSPAuto demo in automatic mode, type:

```
cspauto -<board type> -c<no. of channels> -i<no. of iterations> -l<log name>
```

For example, to run a 12-channel test (two iterations is the default) on an E1 board and log the results in *autotest.log* file, type:

```
cspauto -e -c12 -lautotest.log
```

Note: The `-c` value must be a positive, even number.

4.3.4 Using the CSPAuto Demo (Diagnostic Mode)

The CSPAuto demo is a multi-channel, non-interactive demo that can be run in either automatic mode or diagnostic mode.

In diagnostic mode, this demo can be used to verify operation of parameters available through `ec_setparm()`. The demo alternatively sets each parameter to the minimum value and maximum value, and returns the appropriate message. After the demo is completed, the parameters are reset to their default values (see demo source code). For detailed information on CSP functions and parameters, see the *Continuous Speech Processing API Library Reference*.

To save the results of the demo run in a log file, use the `-l` option.

Example

To run the CSPAuto demo in diagnostic mode, type:

```
cspauto -d -l<log name>
```

For example, to run a test and log the results in *dmtest.log* file, type:

```
cspauto -d -ldmtest.log
```

4.4 Stopping the Demo

Typically the CSP demos run the specified number of iterations and stop automatically.

If necessary, you can press **Ctrl-C** at any time to exit a CSP demo. All channels and files are properly closed by the demo.

The following sections provide further detail on the Continuous Speech Processing demos. You do not need this information to run the demo successfully.

- [Files Used by the Demo.](#) 23
- [Summary of Differences Among Continuous Speech Processing Demos](#) 24

5.1 Files Used by the Demo

Table 3 lists the files used by the CSPLive demo. These files are located by default in `\program files\dialogic\demos\speechprocessing\CSPLive\`.

Table 3. Files Used by the CSPLive Demo

File Name	Purpose
CSPLive.log	Default name of the log file. This ASCII text file logs the results of a CSP demo (diagnostic mode only).
CSPLive.c	Source code file.
CSPLive.exe	Executable file.
rec_xxx.pcm	The file generated when running the CSPLive demo in interactive mode, where <i>xxx</i> represents the number of the channel being tested. For example, <i>rec_002.pcm</i> is the file for channel 2 which is being tested. This file contains a recording of speech from the channel being tested.
Welcome.pcm	The outgoing prompt used by the channel being tested. This prompt simulates what a caller might hear.

Table 4 lists the files used by the CSPAuto demo. These files are located by default in `\program files\dialogic\demos\speechprocessing\CSPAuto\`.

Table 4. Files Used by the CSPAuto Demo

File Name	Purpose
Bargeln.pcm	The second welcome prompt used when running the CSPAuto demo (in automatic mode). Used by the stimulus channel to simulate a person speaking.
CSPAuto.c	Source code file.
CSPAuto.exe	Executable file.
CSPAuto.log	Default name of the log file. This ASCII text file logs the results of a CSPAuto demo run. For example, the log lists the test mode, number of channels used, number of iterations, and the activities that occur as the demo progresses.
rec_chxx.pcm	The file generated by the <code>ec_reciottdata()</code> function, where <code>xx</code> represents the number of the channel being tested. For example, <code>rec_ch02.pcm</code> is the file for channel 2 which is being tested. This file contains a recording of speech from the stimulus channel when running the CSPAuto demo (in automatic mode).
Welcome.pcm	The first prompt used by the channel being tested. This prompt simulates what a caller might hear.

5.2 Summary of Differences Among Continuous Speech Processing Demos

The following summarizes the differences in how the demos operate on Linux and Windows:

- The functions `dx_fileopen()`, `dx_fileclose()`, `dx_write()` are used in Windows but are not supported in Linux. Linux version uses `open()`, `close()`, `write()`.
- The parameter `_O_CREAT` is used in Windows, while `O_CREAT` (without the leading underscore) is used in Linux. The parameter `O_BINARY` is not used in Linux.
- `Sleep()` is used in Windows; `sleep()` in Linux. In Linux, `sleep()` is in units of seconds while in Windows, `Sleep()` is in units of milliseconds.
- In Linux, define “NULL” to 0 for `dx_open()`.
- In Linux, `sr_getboardcnt()` is not supported and not used.
- Wink handle section was rewritten in Linux.
- In Linux, `windows.h` and `Beep()` are not used. The header file `sys/time.h` is used instead of `time.h`, and `sys/io.h` is used instead of `io.h`.



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