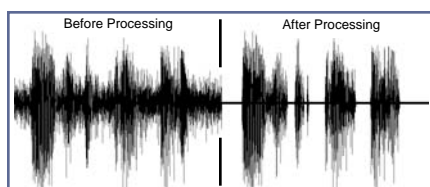


ClearSpeech technologies -  
a suite of signal processing  
algorithms, hardware and  
technical expertise for enhancing  
voice communications.



Muting of non-speech segments in a noisy radio signal.

### Operation

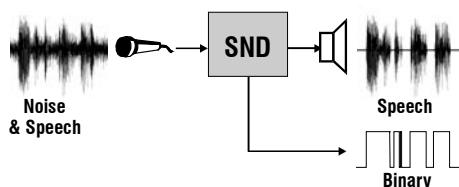
ClearSpeech® Speech in Noise Detector (SND) is an algorithm designed to detect speech in a wide range of noise environments.

Producing a Binary value depending on whether or not speech is detected, SND can be used as a noise-robust voice activity detector (VAD).

In addition to the Binary value, SND also provides an audio output for which non-speech segments have been muted.

Operating over a wide range of signal-to-noise ratios (SNRs), SND can be optimized to detect either individual words or phrases.

### Block Diagram



### Performance Characteristics

- Typical convergence time: ~1 sec
- Detection probability: > 95% for SNR > 10dB
- Typical response time: ~ 10ms

### Implementation

SND is an adaptive, frequency-domain algorithm that operates on a single channel of audio. It is designed as a re-entrant module and has been developed using ANSI C to facilitate porting to each customer's platform of choice.

### Implementation (continued)

This code will run on any platform with an ANSI C compiler and includes documentation and test vectors.

Available version:

- 64-sample block length, 8kHz sampling rate, floating point.

Details of the platforms supported can be found on our website.

### Software Requirements

SND may be used on its own or with NCT's Adaptive Speech Filter (ASF) adding minimal computational or memory overhead to that required by ASF.

For 8kHz sampling rate, 64-sample block length:

DSP	AD2106x	
	SND	SND & ASF
<b>MIPS</b>	<b>5.0</b>	<b>5.1</b>
<b>Program Memory (words)</b>	<b>3.5k</b> (48 bit words)	<b>3.5k</b> (48 bit words)
<b>Data Memory (words)</b>	<b>3.5k</b> (24 bit words)	<b>3.5k</b> (24 bit words)
<b>Algorithmic Delay (msec)</b>	<b>16</b>	<b>16</b>

### Demonstration Platforms Available

1. For customers wishing to process their own wavefiles on a Windows®-based demonstration program, please contact us.

### Demonstration Platforms Available (continued)

2. To facilitate evaluation of SND for real-time applications, an executable for the Analog Devices' ADDS2106x-EZLITE evaluation platform is available.

### For Additional Information

Contact [sales@nctclearspeech.com](mailto:sales@nctclearspeech.com).

### Other ClearSpeech Products

SND is part of the ClearSpeech suite of algorithms for enhancing voice communications by removal of unwanted noise.

Other algorithms in the suite are:

**Acoustic Echo Cancellation**, which removes unwanted echo from hands-free communications.

**Adaptive Speech Filter**, which removes unwanted 'stationary' noise from microphone signals.

**Referenced Noise Filter**, which removes noise where a reference signal from the noise producing source is available.

**Line Echo Cancellation**, which removes electrical echo caused by 2-4 wire hybrids in telephone networks.

**Intelligent Squelch Filter**, which reduces unwanted signals such as pops and pre-speech noise experienced in some radio communications.