

SONICCHARGE
BITSPEEK
version 1.0.2

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INTRODUCTION

Bitspeek is a real-time pitch-excited linear prediction codec effect. Right now you are probably thinking, "oh, another one of those"? Or perhaps not. Chances are that you have never heard about "linear prediction", although most of us use it daily when we talk on our cell phones. Linear prediction coding is a voice compression technology that appeared in commercial products in the seventies and was implemented in some well-known speaking toys of the early eighties.

We have applied this technology to create a VST / AU effect plug-in that analyzes audio, extracts a number of parameters (including pitch, volume and formant data) and then resynthesizes the audio using a simple oscillator, noise and filter architecture.

Ever heard the robotic voice in μ Tonic that reminds you to purchase? That is an example of what Bitspeek can sound like. But there is more to it. We have added a number of playback parameters that adjusts the pitch and tonal quality of the sound as well as support for MIDI and a beat-synchronized "formant freezing effect". Despite having only a few simple controls, this box can produce a broad range of sounds from cheap speaking toys to high-end vocoder and talkbox effects.

/ Magnus Lidström

User Interface

Figure 1 *Bitspeek Interface*



Rate (kHz)

Bitspeek performs its calculations at a designated fixed sample-rate, regardless of the sample-rate your project is running at. The possible settings are 8 kHz, 11 kHz, 22 kHz and 44 -> 48 kHz (*the last mode will actually adjust to the project sample-rate and select a rate between 44 and 48 kHz*). Notice that **Bitspeek** is still compatible with any host sample-rate by performing automatic sample-rate conversion. The Rate choice affects several other internal parameters in the DSP algorithms and changing Rate will change the sound dramatically. (*Notice that the 44 kHz mode may require a lot of CPU. In many cases, the 22 kHz mode works just as well.*)

Frame Rate

The audio signal is analyzed and processed in blocks called "frames". For each frame, **Bitspeek** estimates the pitch, volume and formants of the incoming audio, as well as the balance between "voiced" audio (*e.g vowels*) and "voiceless" (*e.g., the noise in a consonant*). By lowering the frame rate, the analysis will be performed more rarely and you will achieve a cheaper toy-like sound. You can also "freeze" the audio by dragging Frame Rate all the way down to 0. The parameter range is 0 to 80 Hz (*if Sync is off*) and higher rates requires more CPU than lower rates.

Sync

Enable Sync to make **Bitspeek** "freeze" frames in sync with the tempo of your music. When Sync is enabled, you may select various time synchronized rates (*1/8, 1/16 etc*) with the Frame Rate slider instead of selecting a rate in Hz.

MIDI

Enable MIDI to control the pitch and envelope of the effect via MIDI. You will need a host that is capable of transmitting MIDI to effect plug-ins in order to use this feature. Please read the documentation for your host for information on how to set it up. When enabled, **Bitspeek** will play only when it receives MIDI and it will transpose the pitch according to the MIDI notes it receives. Turn down the Tracking parameter to zero to achieve a vocoder / auto-tune like sound. If you set the Frame Rate to zero (*with Sync disabled*), **Bitspeek** will "freeze" the formants on MIDI note on, allowing you to create interesting "stroboscopic" audio effects. Finally, **Bitspeek** supports Pitch Wheel messages (*one octave up and down*) and the MIDI Sustain Pedal can also be used to "freeze" frames while playing.

Pitch

You can transpose the outgoing audio by -36 to +36 semitones (*-3 to +3 octaves*). Hold down the shift-key while turning the knob to make finer adjustments down to a single cent in precision.

Tracking

Determines the amount by which the source signal pitch affects the synthesized audio, from 0% to 200%. At 100%, the processed audio will follow the pitch intonation of the original audio as exactly as possible. (*Sometimes though, the tracking detects the wrong octave, especially on source material with extremely low pitch.*) At 0%, the pitch will stay fixed and produce a robotic vocoder-like quality.

Detune

There is a second oscillator which can be used to achieve a fat detuned sound or for chord-like effects. The second oscillator is transposed from the first by +0 to +1200 cents, representing a range of up to one octave.

Noise

This parameter adjusts the balance of "voiced" vs "voiceless" sound. At the default setting +/- 0%, **Bitspeek** attempts to follow the balance of the source signal, so that "voiced" sounds (*like vowels*) produce distinct tones while "voiceless" sounds (*such as consonants*) produce noise. By turning Noise all the way down to -100%, all noise will be removed from the output audio. By turning Noise up to +100%, the output audio will consist only of filtered noise (*sounding like a loud whisper*).

Using Bitspeek in your Host

The DSP algorithm in **Bitspeek** is monophonic but experience has proved that compatibility with monophonic plug-ins is lacking in many major host applications. Therefore we decided to wire the plug-in for stereo input and output, although it will simply mix the two input channels and the output audio will be the same for both channels.

Due to the nature of the algorithms a constant audio latency of 13 ms is added. Most modern hosts compensate for this latency during playback.

Playing the pitch of **Bitspeek** with MIDI notes is great fun, and most hosts support routing of MIDI effects. Here are a few quick instructions on how to set things up in some popular hosts.

Ableton Live 8

1. Turn the MIDI switch to “On” in **Bitspeek** and turn down Tracking to 0%.
2. Create a MIDI track.
3. Assign “MIDI To” to the audio track that contains **Bitspeek**.
4. Make sure “MIDI To” is assigned to the **Bitspeek** effect and nothing else.



Apple Logic Pro 9

1. Turn the MIDI switch to “On” in **Bitspeek** and turn down Tracking to 0%.
2. Create a new instrument track.
3. Click the “I / O” button and select **Bitspeek** under MIDI-controlled Effects.
4. Select your audio track from the Side Chain menu in the top right corner of the plug-in window.
5. The sound from the audio track now passes through the instrument track so mute the output of the audio track.



Steinberg Cubase 6

1. Turn the MIDI switch to “On” in **Bitspeek** and turn down Tracking to 0%.
2. Create a new MIDI track.
3. Select **Bitspeek** as MIDI destination for the new track.



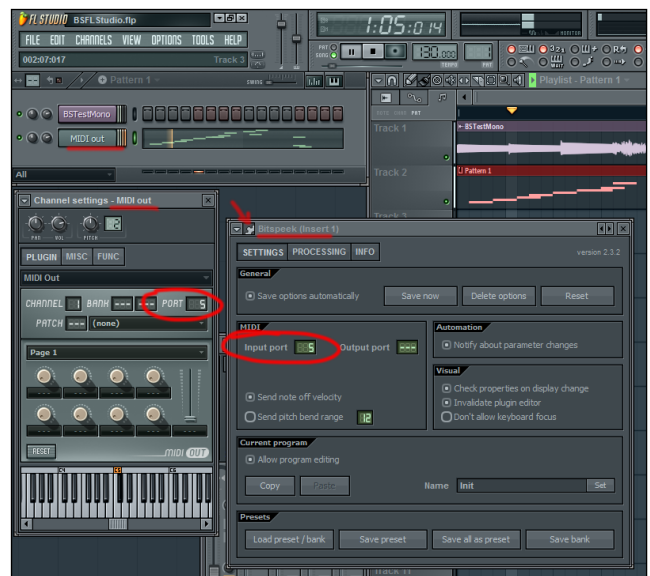
PreSonus Studio One

1. Turn the MIDI switch to “On” in **Bitspeek** and turn down Tracking to 0%.
2. Add an Instrument track.
3. Select **Bitspeek** as destination for the new track.



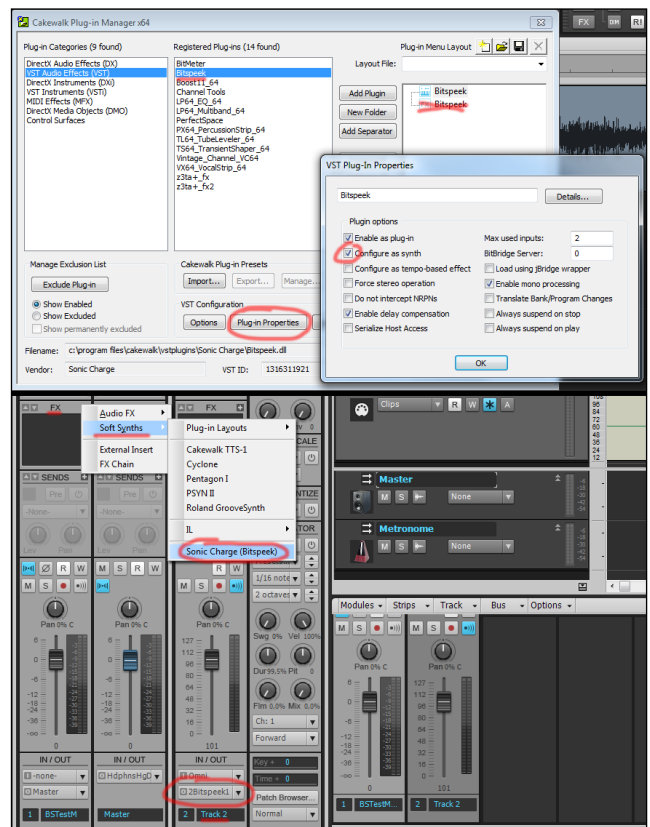
Image-Line FL Studio 10

1. Turn the MIDI switch to “On” in **Bitspeek** and turn down Tracking to 0%.
2. Select a free input port - under the MIDI section in the plug-in settings.
3. Add a “MIDI Out” channel.
4. In the channel setting, select the same port number as you did for **Bitspeek**.



Cakewalk Sonar X1

1. Enter the Cakewalk Plug-in Manager, select **Bitspeek**, click “Plug-in Properties” and choose to “Configure as synth”.
2. Add the new Instrument version of **Bitspeek** and remove the Effect version from your Plug-in Layout.
3. Insert **Bitspeek** in the FX chain as a “Soft Synth” instead of an “Audio FX”.
4. Turn the MIDI switch to “On” in **Bitspeek** and turn down Tracking to 0%.
5. Insert a MIDI track.
6. Select **Bitspeek** as output for the new track.



Change History

Version 1.0.2 (2011-10-07)

- 64-bit support.
- Changed to Stereo I/O configuration (although the effect is monophonic)
- Improved compatibility with older VST 2.3 hosts and wrappers.
- Many other minor compatibility improvements.

Version 1.0.1 (2011-01-01)

- Solved a problem that prevented registration from working if you had not installed **MicroTonic** or **Synplant** before **Bitspeek**.

Requirements

The minimum requirements for installing and running **Bitspeek** under Microsoft Windows are:

- Microsoft Windows XP or later
- A host application that supports 32-bit VST 2.4 plug-ins
- 1GHz Pentium IV or equivalent
- 5MB of free disk space

The minimum requirements for installing and running **Bitspeek** under Mac OS X are:

- Mac OS X 10.5 (Leopard) or later
- A host application that supports 32-bit VST 2.4 or AudioUnit 2 plug-ins
- 1GHz Intel Mac
- 5MB of free disk space

Credits and Contacts

Sonic Charge Bitspeek v1.0.2 (2011)

Created by:

Magnus Lidström

Graphical design and additional development:

Fredrik Lidström

Used technologies: *(see Copyrights section below for more info)*

NuXPixels & AU/VST Symbiosis by NuEdge Development

libpng by G. Randers-Pehrson

zlib by Jean-loup Gailly and Mark Adler

VST Plugin Technology by Steinberg

Audio Units SDK by Apple

Sonic Charge website:

<http://soniccharge.com>

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Please, read the end user license agreement enclosed in the package for a lot more legal mumbo-jumbo.

The contractor / manufacturer for **Sonic Charge Bitspeek** is:

NuEdge Development / Magnus Lidström
Mosebacke Torg 16 A
S-116 20 Stockholm
Sweden