VB-AUDIO CABLE

Virtual Audio Device working as Virtual Audio Cable

Configuring VB-CABLE System Settings

How to configure VB-CABLE Latency and Internal Sample rate .
How to configure HiFi-CABLE Latency

HiFi-CABLE & ASIO Bridge

page 6

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INTRODUCTION

VB-CABLE is installed with default parameters that are expected to work in most of configuration.

However, in some particular cases, or in order to improve audio quality or real time streaming aspects, VB-CABLE control panel allows setting two important system parameters: the **Max Latency** (pipe size) and **internal sample rate** (called 'Internal SR').

VB-CABLE Control Panel shows current system parameters (top-Left) and i/o settings given by current windows configuration or by connected client applications (these application might set/change i/o format, pending on O/S version and audio interface type used by them).

VB-CABLE Control Panel also shows statistics related to buffering, helpful to optimize latency. These statistics are simple counters for different buffer size:

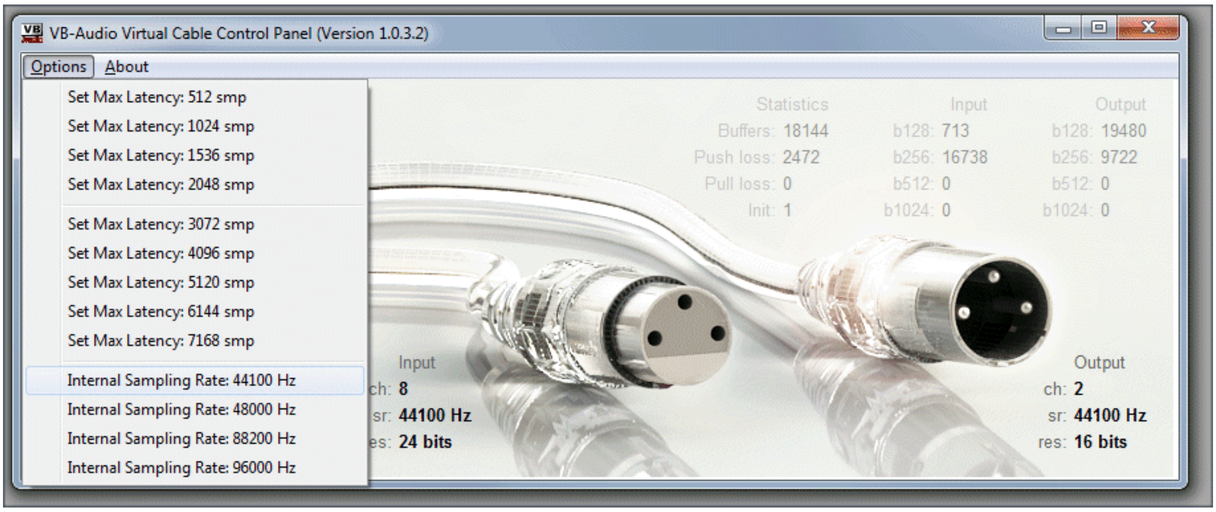
b128 = number of buffer with a size above or equal to 128 samples
b256 = number of buffer with a size above or equal to 256 samples
b512 = number of buffer with a size above or equal to 512 samples
etc…

Operating System can use different buffer size for streaming audio. In the picture above we can see that the cable input (which is a playback audio device) has been fed with 128 samples buffers as well as 256 samples buffers. To be precise, this statistics mean that VB-CABLE has received buffer with a size between 128 and 511 samples.

Configuring Internal Sample rate:

VB-CABLE works internally with a fixed Samplerate (given by Internal SR). It allows managing whatever audio sample rate format on input and output (independently). Then a DVD Player can send 48 kHz sound on VB-Cable input while another audio application can record at 44.1 kHz on VB-Cable Output. Conversion is automatically made by VB-CABLE.

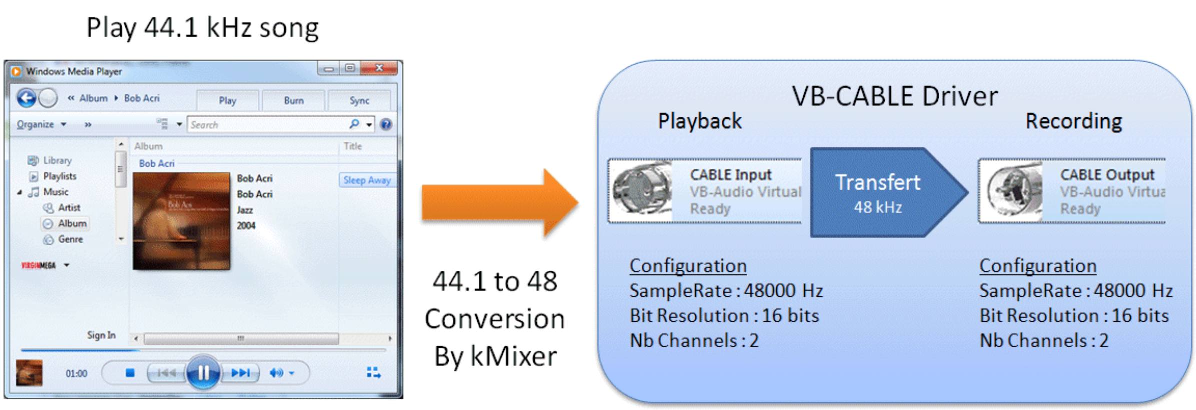
If both i/o have the same sample rate than the Internal SR, the sound pass through the CABLE without conversion, so with the best audio quality ! That's why it can be useful to set the right Internal sample rate for given use cases.



VB-CABLE supports 8kHz to 96 kHz sample rate on i/o, but only 4 standard Internal sample rate are available: 44.1, 48, 88.2, and 96 kHz.

WARNING

It's not because the VB-CABLE is running with the same sample rate on all i/o and internal SR, that there is no conversion in the global audio stream. According Windows Version and Audio Interface Type used by client applications (e.g. MME) system components (like kMixer for example) can make required conversion and decrease sound quality (independently from the VB-CABLE).



Under Win7 conversion is made, but under XP VB-Cable Input Samplerate is changed by windows media player.

Finding Best Latency:

Basically the VB-CABLE needs 3 buffers to make a continuous audio stream (one for input, one for internal, one for output), the difficulty to set the Max Latency is given by the operating system which is using various buffer size to stream audio.

Max Latency = 3 x Max Buffer Size

Statistics are there to let you define rationally the best Max Latency of the cable and first to find the biggest buffer size used by current audio stream. It means you need to play the stream through the cable (with the player application and recorder application if any) to analyze statistics before setting VB-Cable Max Latency.

It's important to understand that audio stream buffering is pending on client applications and audio interface used by these applications (MME, KS, WASAPI behave different). If you set optimal latency for your DVD player and Audacity using KS audio interface, it could not work anymore with other player and recorder application.

Finding Max Buffer Size:

According statistics left there, audio stream is never using buffer size above or equal 512 samples.

Consequently this stream should work with 512 samples buffer. 512 can be considered as the max buffer size used by current audio stream.

So MAX Latency = 3 x 512 = 1536

This result is true only if sample rate configuration is the same for i/o and internal SR.

This basic formula is working also for Hi-Fi Cable. However, for VB-CABLE where internal sample rate can be different from input sample rate and output sample rate, best Max Latency will need to be scaled by the ratio: InternalSR / (i/o SR).

$$Max\ Latency = 3 \times (Max\ Buffer\ Size) \times \frac{InternalSR}{outputSR}$$

In the example above, if internal sample rate is 96 kHz and i/o SR is 44.1 kHz, then our Max Latency must be scaled by 96/44.1.

$$Max\ Latency = 3 \times 512 \times \frac{96000}{44100} = 1536 \times 2.177 = 3343$$

So, the real MAX Latency in this case must be set to 4096 samples.

Finding Optimal Latency in particular cases:

General formula to compute Optimal Max Latency is much more complicated and would need to be implemented in the Control Panel as a Suggestion for users … However we can study different possible cases according statistics results.

Always take the Maximum Buffer given by statistics:

Here, according statistics, the stream of the Audio Source Application is using 512 sample max buffer while the stream of the Audio Recorder application uses 1024 samples Max Buffer.

Use biggest value and compute Max Latency with it = 3 x 1024 (x SR scale)

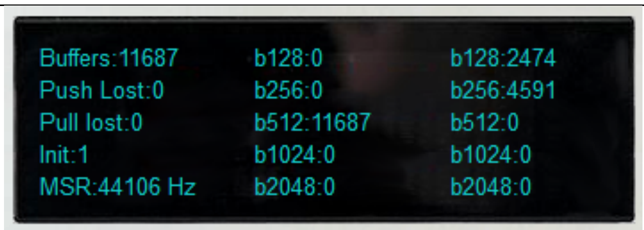
Important remark: VB-CABLE will work correct if its current Latency is equal or above the computed MAX Latency with Statistics (that's why default value is 7x1024 or 8x1024 samples. This value should work correct for most of the cases, up to 96 kHz stream). However, if the current MAX latency is lower than the computed MAX Latency according statistics, you might get cut in the sound (stream continuity problem).

Use Max Latency if Statistics are overloaded:

If Streaming is using 1024 samples buffer and more, you are obliged to consider using max Latency without being sure it will work correct (streaming might use 2048 or 8192 buffer as well, we cannot see it here because statistics are limited to 1024 buffer size).

Note: for VB-CABLE, you can decrease the Internal SR to increase effective pipe size.

Statistics on Hi-Fi Cable:

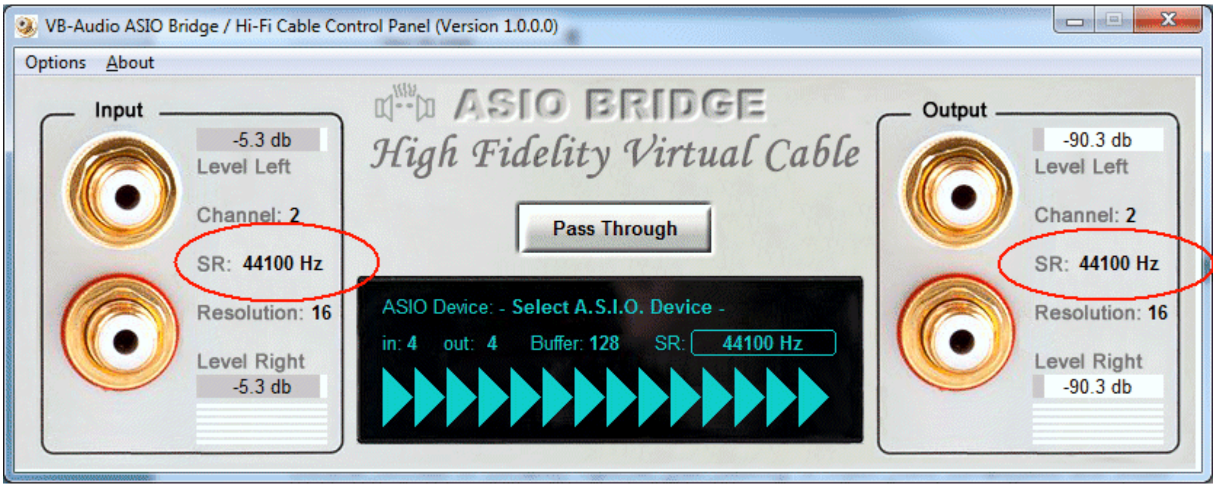


Hi-Fi Cable Statistics go up to 2048 buffering because can support bigger sample rate, and audio streaming is usually increasing buffering with samplerate.

REM : When client audio application are using KS or WASAPI audio interface, VB-CABLE usually receive the same buffer size. This is the case here above where only b512 counter is increased on input (because audio sound is sent through KS interface with 512 sample buffer) while MME buffering can use various buffer size to manage audio stream (as we can see it on output statistics – the right column). Consequently, If you are sure about how your audio application are buffering audio stream, you might use it to configure Max Latency (without needing to use statistics – or just to check the consistency of your settings).

Hi-Fi Cable Max Latency Settings:

HiFi Cable is a bit different (compared to original VB-CABLE) since it does not include an SRC (Sample Rate Converter). Consequently, it works correctly only if i/o are configured with the same sample rate.



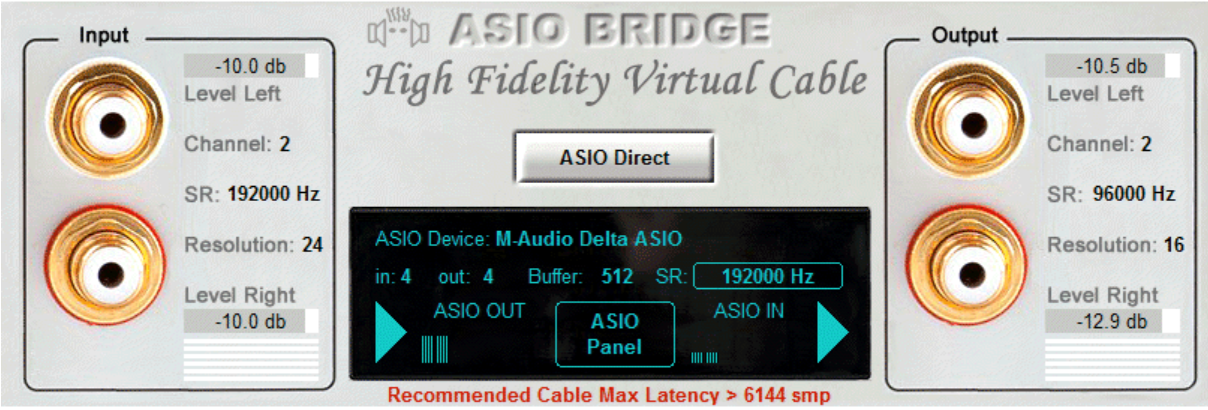
HiFi Cable Control Panel is called **ASIO Bridge** because it also allows routing virtual i/o to an ASIO Device. Per default HiFi Cable is in **Pass Through** mode: The regular mode where all incoming audio on input is going to audio output of the Hi-Fi Cable. In **ASIO Direct** Mode the HiFi Cable Input is routed to ASIO output and the ASIO input is routed to HiFi Cable Output. In a way, ASIO Bridge is an Audio Interface Converter allowing audio application to use ASIO device through its regular audio management (MME, KS, Direct-X or WASAPI).

NOTE : If the ASIO Bridge Application is not launched then the Hi-Fi Cable is PASS Through anyway.

HiFi Cable Max Latency:

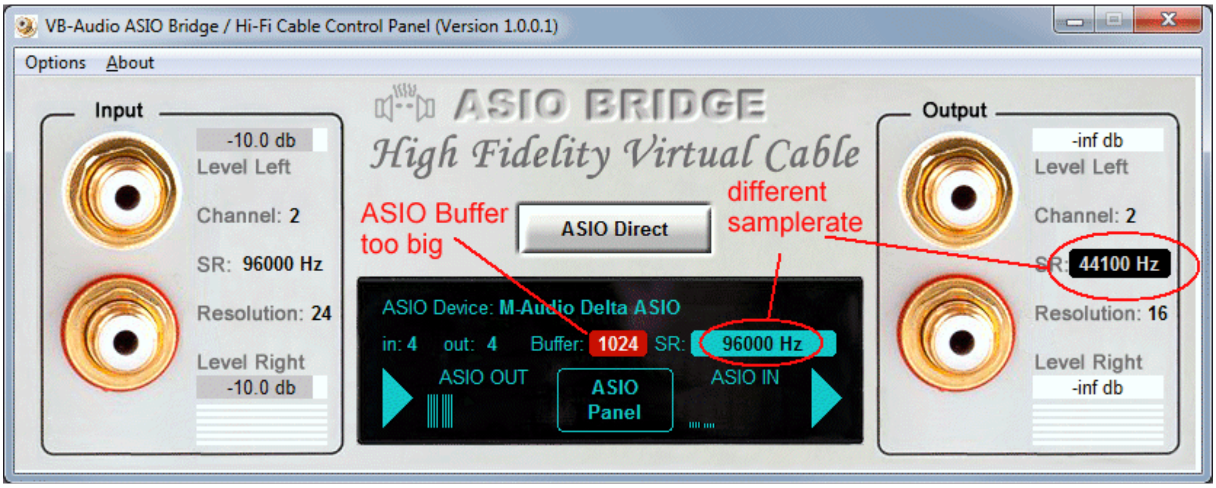
Since it support up to 384 kHz audio stream, Hi-Fi Cable includes more options to set maximum latency time (up to 32k samples).

Alert when Max Latency is not big enough:
HiFi Cable Control Panel is analyzing statistics every second to check if the pipe size is big enough to support buffering used by the different i/o streams. And if current MAX Latency is too weak, we got a blinking text below LCD proposing a new MAX Latency.



The red text below the LCD is displayed when current Cable Latency is too small to support current audio stream.

Alert when ASIO Buffer is too big.
ASIO Buffer size is displayed in a red blinking rectangle if it is too big compared to the cable MAX Latency. Again we must respect the main rule where buffer used must have size below 1/3 of the Cable MAX Latency.



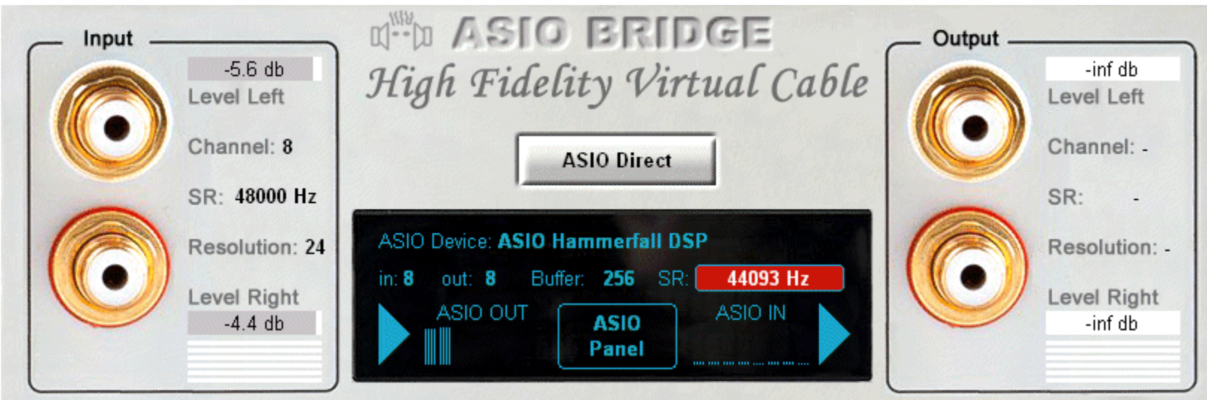
Alert when Sample rate are different.
Since the Hi-Fi Cable do not include a sample rate converter, all sample rate must be the same to make the different stream work correctly. These displayed sample rate are blinking on ASIO Bridge Dialog box only if used: it means only if there is an application connected to the virtual audio input out output.

REM : Of course if its blinking you can expect to have a corrupted audio stream, because not working in the right samplerate.

Alert when ASIO Driver is not started:
If ASIO Driver is not started, the device name is followed by the mention (STOPPED). To restart it, reselect ASIO Device in popup menu, or change twice the ASIO Bridge mode (PASS Through and ASIO Direct).

Alert on bad ASIO Clock
ASIO Bridge includes a sample rate measurement to check the real sample rate delivered by ASIO driver. This is done to detect wrong hardware configuration: bad sync mode, wrong word clock and whatever clock default if any.

Typical problem comes from hardware input that can use a different sample rate than the one required by the software. If you play a DVD asking for 48 kHz, ASIO Driver can start with this setting but work finally in 44.1 kHz because converter or audio physical connection is driven by another clock.



If there is an ASIO Clock problem, the measured sample rate (here 44100 Hz) is shown in a blinking red rectangle.