This document is a guide to using the emu10k1 based devices with JACK for low latency, multichannel recording functionality. All of my recent work to allow Linux users to use the full capabilities of their hardware has been inspired by the kX Project. Without their work I never would have discovered the true power of this hardware.

http://www.kxproject.com

- Lee Revell, 2005.03.30

Low latency, multichannel audio with JACK and the emu10k1/emu10k2

Until recently, emu10k1 users on Linux did not have access to the same low latency, multichannel features offered by the "kX ASIO" feature of their Windows driver. As of ALSA 1.0.9 this is no more!

For those unfamiliar with kX ASIO, this consists of 16 capture and 16 playback channels. With a post 2.6.9 Linux kernel, latencies down to 64 (1.33 ms) or even 32 (0.66ms) frames should work well.

The configuration is slightly more involved than on Windows, as you have to select the correct device for JACK to use. Actually, for qjackctl users it's fairly self explanatory - select Duplex, then for capture and playback select the multichannel devices, set the in and out channels to 16, and the sample rate to 48000Hz. The command line looks like this:

```
/usr/local/bin/jackd -R -dalsa -r48000 -p64 -n2 -D -Chw:0,2 -Phw:0,3 -S
```

This will give you 16 input ports and 16 output ports.

The 16 output ports map onto the 16 FX buses (or the first 16 of 64, for the Audigy). The mapping from FX bus to physical output is described in SB-Live-mixer.txt (or Audigy-mixer.txt).

The 16 input ports are connected to the 16 physical inputs. Contrary to popular belief, all emu10k1 cards are multichannel cards. Which of these input channels have physical inputs connected to them depends on the card model. Trial and error is highly recommended; the pinout diagrams for the card have been reverse engineered by some enterprising kX users and are available on the internet. Meterbridge is helpful here, and the kX forums are packed with useful information.

Each input port will either correspond to a digital (SPDIF) input, an analog input, or nothing. The one exception is the SBLive! 5.1. On these devices, the second and third input ports are wired to the center/LFE output. You will still see 16 capture channels, but only 14 are available for recording inputs.

This chart, borrowed from kxfxlib/da_asio51.cpp, describes the mapping of JACK ports to FXBUS2 (multitrack recording input) and EXTOUT (physical output) channels.

```
/*JACK (& ASIO) mappings on 10k1 5.1 SBLive cards:
-----------------------------------------
JACK            Epilog          FXBUS2(nr)
-----------------------------------------
capture_1       asio14          FXBUS2(0xe)
```

```
capture_2       asio15          FXBUS2(0xf)
capture_3       asio0           FXBUS2(0x0)
^capture_4      Center          EXTOUT(0x11)    // mapped to by Center
^capture_5      LFE             EXTOUT(0x12)    // mapped to by LFE
capture_6       asio3           FXBUS2(0x3)
capture_7       asio4           FXBUS2(0x4)
capture_8       asio5           FXBUS2(0x5)
capture_9       asio6           FXBUS2(0x6)
capture_10      asio7           FXBUS2(0x7)
capture_11      asio8           FXBUS2(0x8)
capture_12      asio9           FXBUS2(0x9)
capture_13      asio10          FXBUS2(0xa)
capture_14      asio11          FXBUS2(0xb)
capture_15      asio12          FXBUS2(0xc)
capture_16      asio13          FXBUS2(0xd)
*/
```

TODO: describe use of ld10k1/qlo10k1 in conjunction with JACK