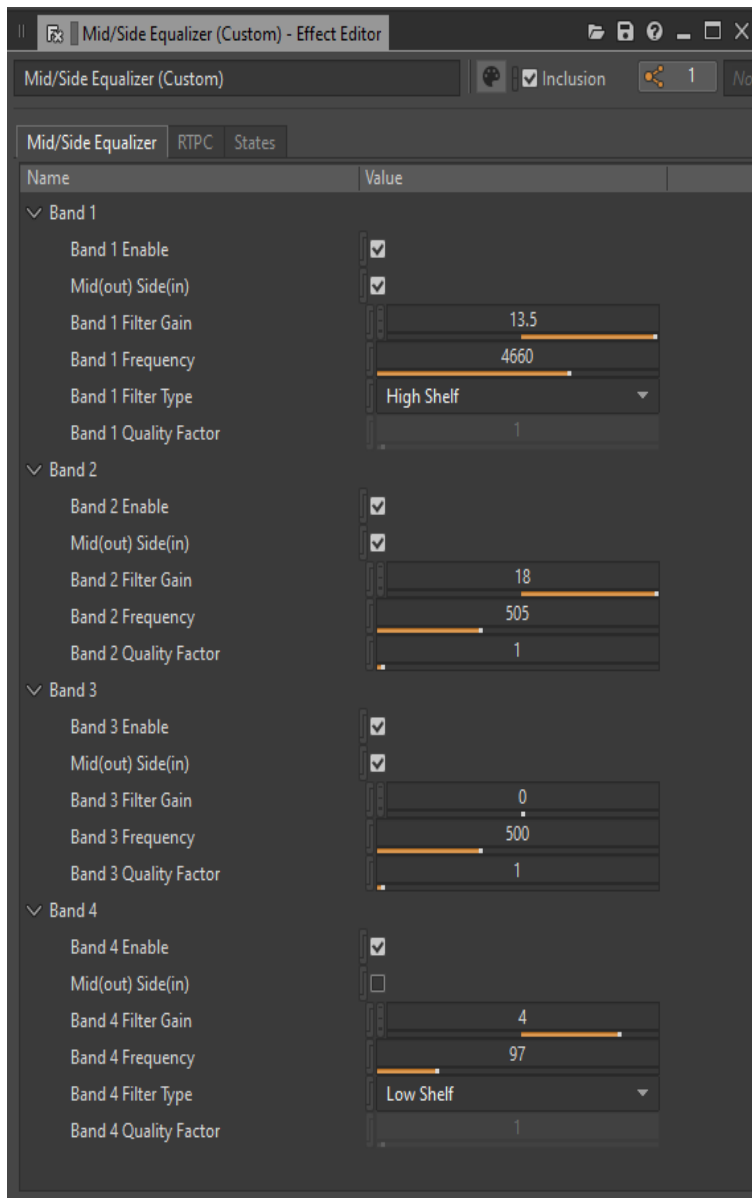


Mid/Side Equalizer Audio Plug-in for Wwise Design Doc

Problem: Sound become more omnidirectional as frequency decreases, yielding a localization error for low frequency sounds. Wwise currently supports monaural low frequency sound as a low-frequency effects buffer (LFE), but control over the stereo width of frequency bands for a full-spectrum source is not supported.

Solution: Utilizing sum and difference signals, a 'mid/side' 4-band parametric equalizer is outlined. Bands 1 and 4 utilize a maximally flat passband (Butterworth) filter design with options for low pass, high pass, low shelf, and high shelf filter types. Inner bands 2 and 3 utilize a simple biquadratic peak design.

Manual: * Subject to change**



- Each parameter supports RTPC control. Filter smoothing for parameter modulation is not yet supported.
- For gain of 0.0 on a given band, source audio is not run through corresponding filter (optimization).

- Band one features a mid/side selection control, +/- 18dB of gain, a frequency range of 20hz to 20khz, and a selectable low pass, high pass, low shelf, and high shelf 20th order Butterworth filter.

- Band two features a mid/side selection control, +/- 18dB of gain, a frequency range of 20hz to 20khz, and 0.5 to 40.0 Q control. Biquadratic 5-coefficient Direct Form I Peak Filter.

- Band three features a mid/side selection control, +/- 18dB of gain, a frequency range of 20hz to 20khz, and 0.5 to 40.0 Q control. Biquadratic 5-coefficient Direct Form I Peak Filter.

- Band one features a mid/side selection control, +/- 18dB of gain, a frequency range of 20hz to 20khz, and a selectable low pass, high pass, low shelf, and high shelf 20th order Butterworth filter.

Further Description: This plugin makes use of Vinnie Falco's DSP Filter states for bands 1 and 4 (<https://github.com/vinniefalco/DSPFilters>). Thanks Vinnie! For higher-order filters, and without re-inventing the wheel, Chebyshev, RBJ, elliptical, or Bessel designs can be configured.

Uses: A common use case for mid/side processing is audio mastering. Bands 1 and 4 are intended to be used on Wwise buses, with bands 2 and 3 on source content. Note that intent does not have to define use! A way to spatialize diegetic game audio could be to apply ~-2dB to a high-shelf filter in 'mid' mode at 2000hz to let the sides through, with ~-4dB to a low-shelf filter in 'side' mode at 200hz to reduce directional low frequency content. These are reference values and are not universally applicable.