

Delay

Main purposes:

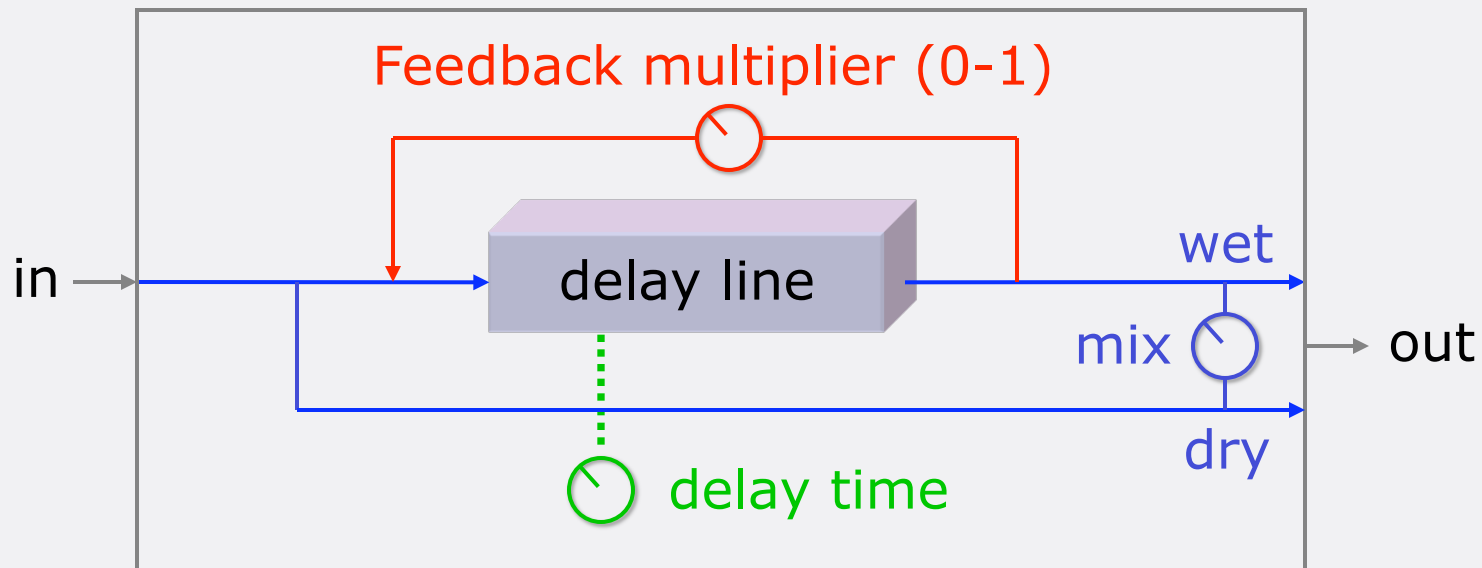
- **Discrete echoes** ... the “grand canyon” effect
- **Thickener** ... for pop vocalists
- **Resonator** ... rings a specific pitch
- **Flanger** ... swooshing airplane sound

Delay Parameters

Delay time — how long to delay input signal

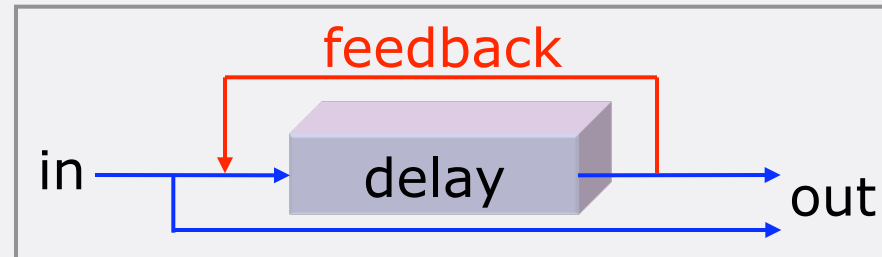
Feedback — how much output to send back into input

Wet/dry mix — balance between original and delayed signal



Discrete Echoes

- delay time above 50 milliseconds (.050 sec)
- feedback



The higher the feedback,
the louder the echoes.

Thickening Delays

- delay time between 20 and 100 msec
- no feedback

Dry:

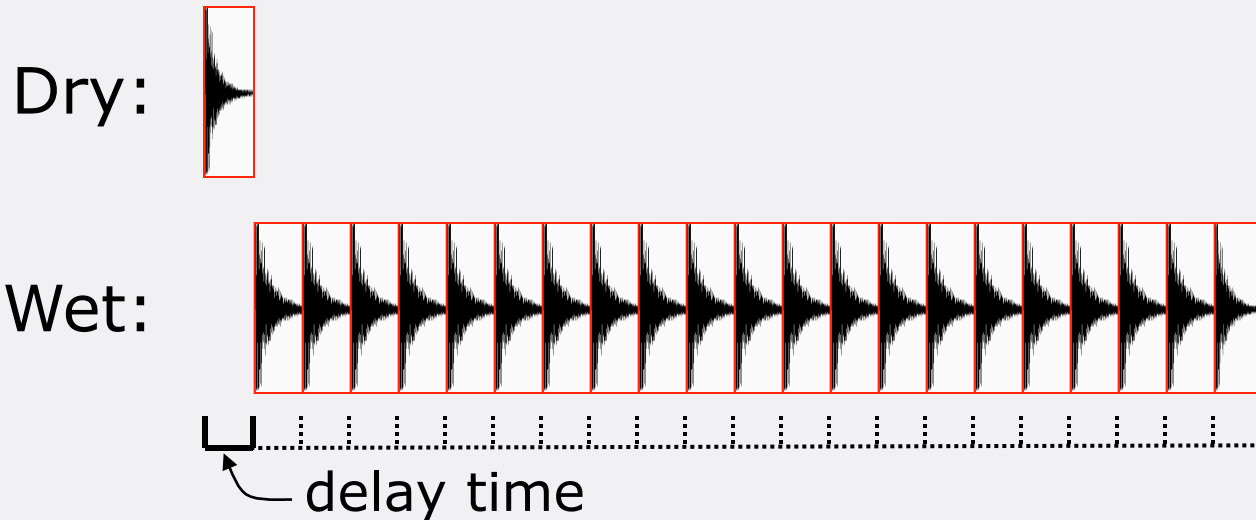


Wet:



Resonators

- delay times below 50 msec
- high feedback



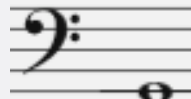
Resonates pitch having one cycle per "echo."
Repeated echoes create a periodic waveform.

How Resonators Work

- A tiny sliver of sound repeats over and over, making a **periodic** waveform.
- The length of the period is the delay time.
- If the period is short enough, we hear a pitch.
- The frequency of the pitch is the reciprocal of the delay time.

Example:

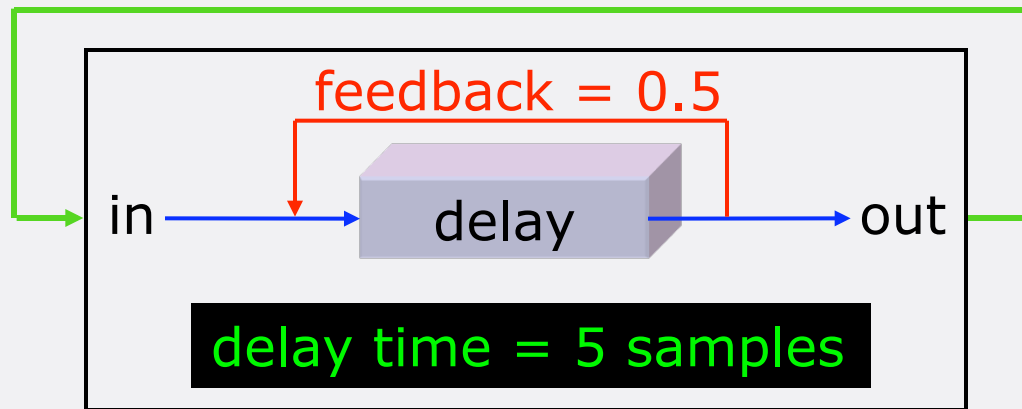
delay time: 10 milliseconds (0.010 seconds)

frequency: $1 / 0.01 = 100 \text{ Hz}$ A musical staff with a bass clef and a single note on the first line, representing the frequency 100 Hz.

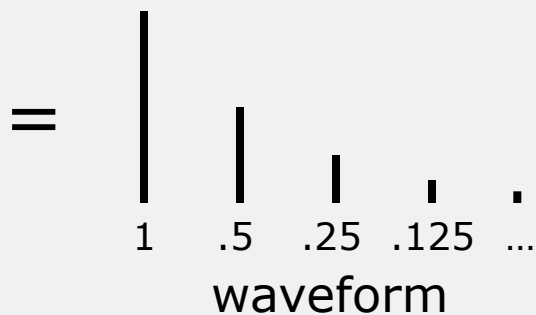
How Resonators Work

Individual sample values: a 1, followed by many 0's

... 0 1



... 0 .125 0 0 0 0 .25 0 0 0 0 .5 0 0 0 0 1 0 0 0 0 0



a pulse train with period
(in seconds) of $5 / \text{sampling rate}$