Reconfigurable architecture for a mixed-signal feedback controller

Research question

How can the distributed digital processing on a digital amplifier controller IC be made as versatile as possible?

Background

Axign is a young start-up company that develops mixed-signal controller ICs. These ICs feature a combination of digital loop-filters and very linear ADCs to enable tight control of external power stages and achieve high performance at low costs. Axign’s first product will be an 8-channel data converter and controller IC with PWM outputs for digital audio amplifiers. The digital filters on this IC are implemented with distributed processing elements.

Assignment

The subject of this assignment is to investigate how the reconfigurability of these processing elements can be improved to enable more versatile applications. A suitable balance has to be found between configurability and hardware costs. Possible directions for investigations can be (but are not limited to):

- Can a simple on-chip network have benefits for the control-path (and possibly the data-path)?
- Is it possible to re-use the processing elements more efficiently for e.g. multiple filter stages?
- Currently, a butterfly structure is used to combine outputs of various channels. This structure might be extended to include other operations?

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