

Local Decoding of Walsh Codes to Reduce CDMA Despreading Computation

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CDMA Cell Sites Are Power-Hungry

- Code Division Multiple Access
 - Moves multiple access problem to DSP

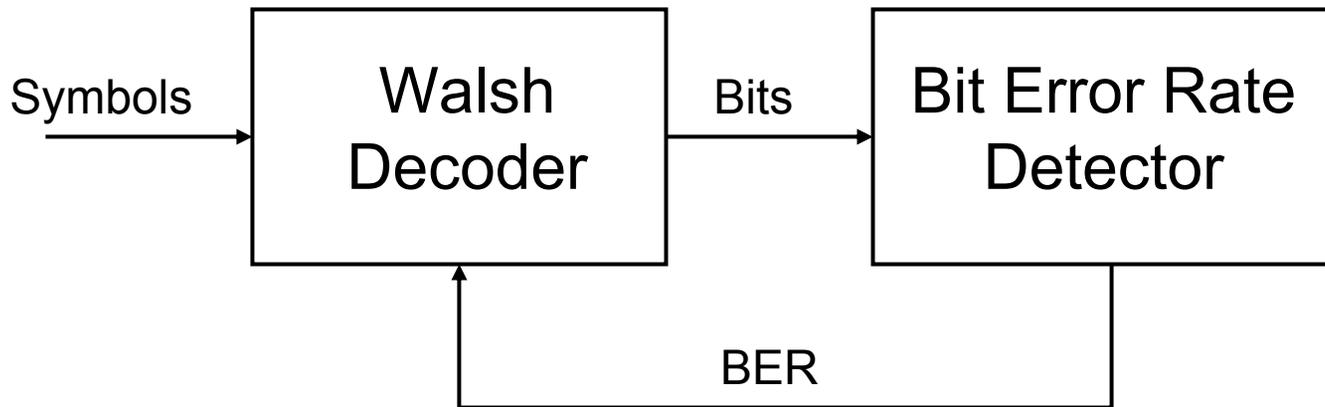
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Please see: http://upload.wikimedia.org/wikipedia/commons/f/f7/Cdma_orthogonal_signals.svg

- Computation uses more power than other standards (TDMA, GSM, etc.)

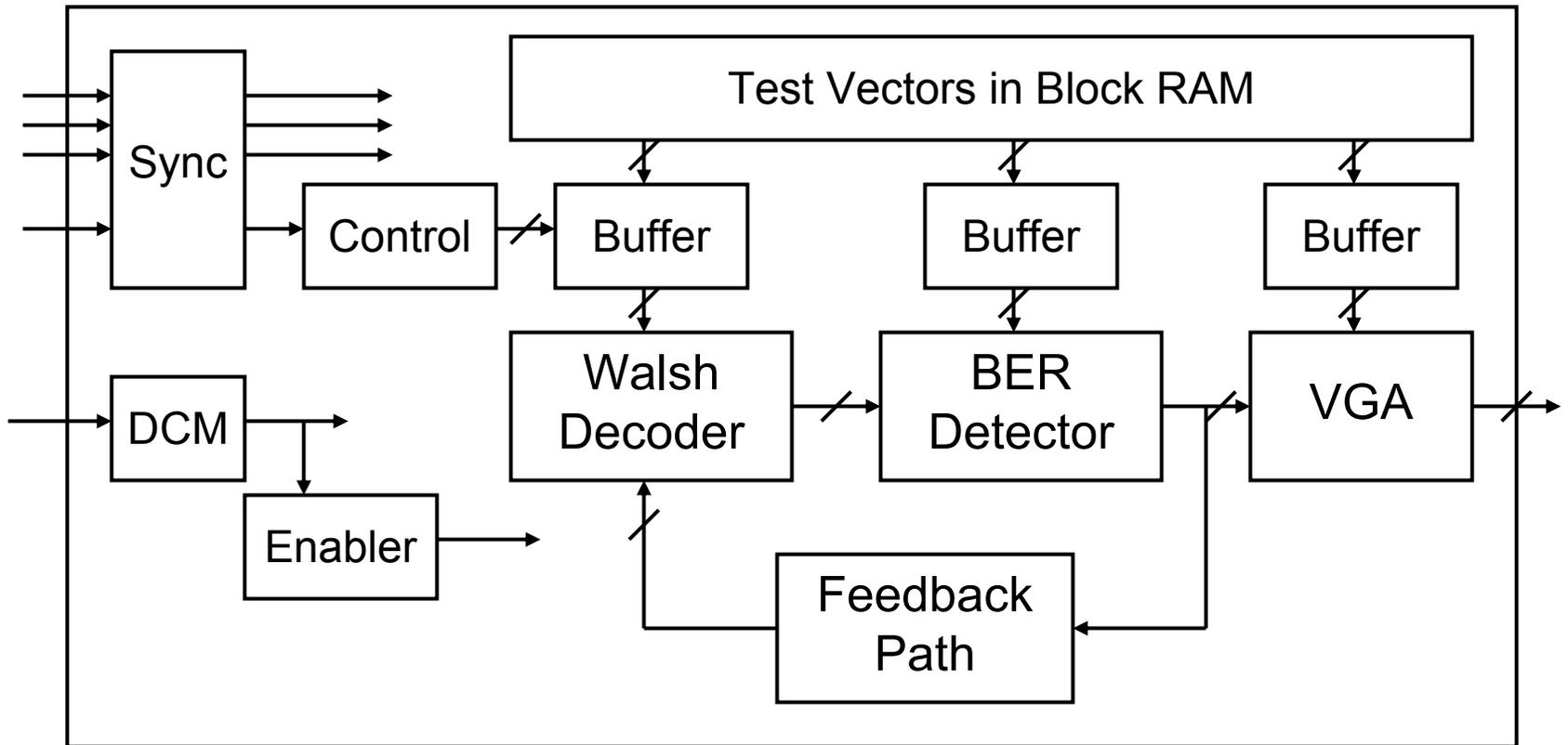
Orthogonal coding functions

Suboptimal Walsh Decoder with Feedback



- Exploit structure of Walsh codes to estimate bits using fewer symbols
- Use feedback to choose number of symbols to use and maintain bit error rate

Test Setup



Bit Error Rate and Power Usage

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Please compare the 1-day and 5-day trends in the stock index of your choice, for example, using <http://finance.yahoo.com/q/bc?s=%5eIXIC&t=1d&c=Bit>

Walsh Decoder FHT

Same algorithm as FFT but with real (1 or -1) coefficients

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Please see <http://etoile.berkeley.edu/~jrg/ngst/fft/fft15b.xbm>

FHT Recombine Algebra

- FFT butterfly structure

$$y_0 = x_0 + x_1$$

$$y_1 = x_0 - x_1$$

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Please see <http://upload.wikimedia.org/wikipedia/en/9/98/Butterfly-FFT.png>