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

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

Orthogonal coding functions

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Please see: http://upload.wikimedia.org/wikipedia/commons/ff7/Cdma_orthogonal_signals.svg
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

- Sync
- Control
- Buffer
- Walsh Decoder
- Buffer
- BER Detector
- VGA
- DCM
- Enabler
- Feedback Path
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/fft15b.xbm](http://etoile.berkeley.edu/~jrg/ngst/fft15b.xbm)
FHT Recombine Algebra

- FFT butterfly structure
  
  \[
  y_0 = x_0 + x_1 \\
  y_1 = x_0 - x_1
  \]

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