Introduction

- First-ever VLSI implementation of wavelet and wavelet-based golay error control codes [1, 2]
- Wavelet code (12, 6, 4) corrects 1-bit errors

Wavelet-based golay (24, 12, 8) corrects up to 3-bit errors

\[ (N, M, d) : (N=code length, M=message length, d=distance) \]

- Golay and Wavelet Error Control Codes in VLSI

Encoding/decoding

- Encoding/decoding functions are implemented largely in combinational XOR logic
- Wavelet encoding/decoding and wavelet-based golay encoding are implemented in single stage combinational block
- Wavelet-based golay decoder uses a sequential logic block with a latency of 12 cycles

Wavelet-based golay encoder

\[ c(n) + e(n) \]

Wavelet-based golay decoder

\[ c(n) = m(n) \]

Output selection

Output selection logic selects 12-bit data from the 54-bit output register file.

Testing & Result

- Tested using HP 83000 Digital IC Test system
- The encoder/decoder logic has been successfully tested for its functionality
- A clock period of 6.9 ns (a speed of 145 MHz) achieved
- The effective data throughput is 145Mhz x 6bits=870Mb/sec.