DETOL Verification

Multiprocessing Pipelined Matched Filter Architecture Using Online Arithmetic.

> ELEC 423 April 23, 2003 Manik Gadhiok Predrag Radosavljevic Nils Bagge



Review of Functional Description
 Functional Test Results
 Speed Test Results
 Yield





Functional Description: Pin Map

	StBit0	StBit1	StBit2	StBit3	Vold	StBit4	Restart	Precision	Clock A	Clock B	GND	Out3	Out2	Out1	N/C	Ready	Accum	Mode	Vadd	N/C	N/C	N/C	
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ln[1]y[1]																							ln[3]y[2]
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ln[2]y[2]																						8	ln[4]y[1]
N/C																						8	ln[4]y[2]
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Functional Description

Multiprocessing Pipelined Matched Filter architecture using online arithmetic



Functional Tests Performed

Tests performed using TLA & Omnilab: Full-precision (4-digit online output, 12-bit) Fast Precision-1 (1-digit online output) Full-matched filter mode Online addition only (mult. bypassed) Goals: Verify online multiplier functionality Verify online adder functionality Verify overall matched filter functionality

Functional Test Results

Successes:

Online multiplier works properly

 Very complex -> Very gratifying!

 Online adder works as designed
 Proper transitions of the PLA states
 Final Output:

 Correct for Fast Precision-1

Flaw:

Final Output incorrect for Full Precision

 Suspected error: final adder receiving out-of-sync control signals (PLA load/clear of pipeline/adder registers)

Speed Test Results

Highest usable clock frequency:

 ~45 MHz ⇔~22ns clock period.
 Glitching becomes excessive at 50MHz.

 Roughly same as Spice analysis suggested: 42.18MHz

Testing Portfolio

Testing Portfolio: Mode-1 Full-Precision

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Testing Portfolio: Mode-0 Full-Precision

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Testing Portfolio: Mode-1 Precision-1



Testing Portfolio: Mode-1 Full-Precision



Testing Portfolio: Speed Test (f=10MHz)

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Testing Portfolio: Speed Test (f=20MHz)

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Testing Portfolio: Speed Test (f=50MHz)

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Conclusions

Work-around: Matched-filtering still possible using two multipliers on chip (thanks to redundancy in design) Using multi-chip configuration, can still achieve higher data-rate/longer spreading codes Yield: all 5 chips are working identically

Conclusions

