The Effects of BTI Aging on the susceptibility of On-Chip Communication Schemes to Soft Errors in Nano-Scale CMOS Technologies

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Abstract. The continuous scaling of semiconductor devices has introduced new circuit failure mechanisms such as bias temperature instability, and made existing reliability problems more severe such as single event transients (SET), variability and crosstalk. This work provides a frame work to quantify the soft errors induced by crosstalk and radiation hits in on-chip communication schemes and investigates the effects of aging on the susceptibility of on-chip communication to these transient failures. It also provides a comprehensive comparison between synchronous and asynchronous communication methods in terms of their robustness against soft errors. Our results based on SPICE level simulations in 90 nm technologies indicate that BTI aging increases the probability of delay-induced soft errors but mitigate the effect of glitches-triggered errors.