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A probabilistic approach to performance estimation at higher abstraction levels for communication-based system-level design.

Today's embedded system designers face the challenges of ever increasing complexity and shorter time-to-market deadlines. System-level methodologies emerge to meet these challenges. Refinement-based methodologies, such as the SpecC methodology and Transaction Level Modeling, continue to gain popularity in the embedded system designers' community.

However, as more communication-dominated applications and architectures appear in the market, designers find that the lack of models allowing system-level communication analysis is a major limiting factor in current system-level design methodologies. Thus, modeling for system-level communication analysis is key for a design methodology to thrive with today's embedded system designers. This work presents a new approach to system-level modeling that allows better communication analysis earlier in the design process. This approach defines a new model that utilizes random variables to include the communication details at higher abstraction levels. This work proposes a probabilistic model to include and evaluate the system communication features in the higher abstraction level. Guidelines to include the proposed model into a refinement-based methodology are presented, and methods for performance estimation are shown.