Trivector Services Validates Time Latencies for Ares I Rocket With Mathworks Products

Model-Based Design Reduces Timing Analysis Time by 60% by Validating Requirements Prior to Hardware Development

MathWorks [1] today announced that TriVector Services [2] used Model-Based Design to reduce the validation time on design of communication buses for NASA's Ares I rocket by more than one year. TriVector used MathWorks products to create a system model to serve as an executable specification throughout development. The model was used to analyze timing performance and to validate system requirements before committing to hardware, reducing the overall task duration for timing analysis by 60%.

TriVector engineers used Simulink, Stateflow and SimEvents to develop system-level models of the Ares I internal communication systems. Simulating these systems allowed engineers to assess end-to-end latencies by tracing each packet from its source to its destination to verify that it was delivered within the time frame required. The team then used MATLAB to post process the simulation results, to create plots of packet latency, and to visualize and communicate results easily. The team has completed the initial timing analysis for more than a dozen communications buses in the First and Upper Stages of Ares I.

The ability to model and test the system through simulation prior to hardware development has reduced verification time by over a year. The simulation-based approach also allowed errors to be caught that would have been much more difficult to discover using traditional spreadsheet-based approaches.

"Our SimEvents model for Ares I tracks delivery time for approximately 20,000 packets per second across multiple buses, enabling us to validate requirements and identify issues with the timing requirements prior to hardware design," said Kerry Alexander at TriVector Services. "Model-Based Design helped us model the system based solely on requirements and graphically represent the analysis results to prove that timing requirements could be met."

"Model-Based Design remains critical as aerospace engineers develop, verify, and certify high-integrity embedded systems," said Jon Friedman, aerospace & defense industry marketing manager at MathWorks. "TriVector's ability to use Model-Based Design to analyze communication between the architecture's avionics systems was critical to the success of verifying the Ares I communications system performance."

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