

SPACE SYSTEMS SYMPOSIUM (D1)  
Space Systems Architectures (4)

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FORMAL MODELING FOR SATELLITE NETWORK SIMULATION

**Abstract**

There are lots of satellite network simulation systems developed or being developed, but these simulation systems obviously lack solid theory foundation, which causes great inconvenience to correctness verification and performance evaluation. Formal methods can convert informal specifications into formal description for the purpose that the dynamic behaviors of the modeled systems can be formally described with unambiguous precise definitions, and effective mathematic tools for the specification, design and verification can also be provided. In order to support the formal description and verification of satellite network simulation systems, a formal modeling approach is introduced and a concept model applying to satellite network simulation is also designed. The need for formalized approaches for defining and understanding satellite network simulation is explained first, the role of the formal model in satellite network simulation and the theory behind the model are also discussed. The formal model is proposed and analyzed at length. Application of the formal model to the requirements definition and the development of satellite network simulation system is introduced, which is validated in a real-world system we developed so as to verify the safety and correctness of system design by model checking. Key words: formal modeling; verification; satellite network; simulation