

Scientific Objective and Infrastructure of Space Exploration (1)
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SYSTEM LEVEL VERIFICATION OF COMPLEX INFORMATION FLOW FOR DEEP SPACE EXPLORATION PROBES

Abstract

System level testing is becoming increasingly important. It is driven not by the march of technology, although that certainly has an impact, but by the incessant march of complexity. And it especially embodies at the complex information interaction for the deep space exploration probes. Nearly all of the system level functions are implemented dependent on the information web to keep the probe system available for the specific flight mission. Thus, how to draw the inference of good system performance from the perspective of information analysis and verification is a researching highlight. Currently, there is only a few test cases generated from the information analysis and the generative process is subjective to some extent. This paper gives the concrete procedure to develop the complex information flow testing cases for system level verification. Firstly, the definition and the classification method of system level information flow is presented; Secondly, the information flow analysis is performed and finished in the form of information flow table and graph, which are the specified description means of information flow; Thirdly, the outline design of test cases is accomplished in form of the outline design table; Then, the information flow is modeled based on the multi-signal flow graphs, and from which the dependency matrix is produced; After that, the testing procedure is obtained upon the combination use of outline design table and dependency matrix; In addition, the dependency matrix can be used to locate the fault if the testing case is failed to be executed. Because of the close relationship between the information flow and the probe system performance, the idea of developing the testing cases upon the complex information flow can help us find the real scheme and boundary of every system level function, which makes the testing more systemic. Hence, the completeness and effectiveness of the testing are improved obviously.