

Proposal of CSP based Network Design

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Short Paper

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ABSTRACT

As bit serial interconnect protocol adopted by SpaceWire allows us to form flexible network topology, we can construct the best optimized network system for a particular space mission. We can make also a fault-tolerant system on top of that by adding several duplicated network path rather than minimal topology. Consequently we can setup the system more rigid and securer with relatively easier effort owing to the simple bit serial protocol which is based on IEEE 1355 than any other bus connection networks.

The number of nodes in this network, which is even for a specific purpose in a part of the whole system, can be however, increased easily up to several hundreds with TM/TC devices, micro-processors for data processing and routers. Many processors in the system should process and analyze data inputted asynchronously from the front-end devices, and accurate information as a result of data analysis should be feed-backed to the front-end in a real time manner.

In order to extract the best performance of such a system, the selection of the software language is also important. In this report we propose to use a programming language of event driven type in order to keep high parallel processing performance and excellent promptitude. We also propose to use a language based on Communication Sequential Processes (CSP). Since CSP has aspects of both basic principle of a programming language and a system description tool for parallel processing system in terms of formal design, we can design, construct and implement failure-free system using this principle. The real time condition of the system is also satisfied because of the inherent event driven nature embedded in CSP as a channel communication.