

# Models Of The Fault-Tolerant Systems, Build From The Same Type Of Modules With Sliding And General Redundancy

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**Abstract** - Fault-tolerant system with combined structural redundancy is used in the design of the server node memory and an uninterruptible power supply system of very important purposes. Suggested reliable models of such devices have a high degree of adequacy and allows to solve problems which contains multiple choice analysis with acceptable to the designer time expense.

**Keywords** - reliability, fault-tolerant system, combined structural redundancy, reliable design.

## INTRODUCTION

There are high requirements to the reliability of the radio electronic systems of the substantial purpose. To ensure these requirements devices are designed as Fault-tolerant systems using a combination of structural redundancy. We consider devices built from similar modules, for which bough sliding reservation modules, and total reservation device are provided. (Fig. 1)

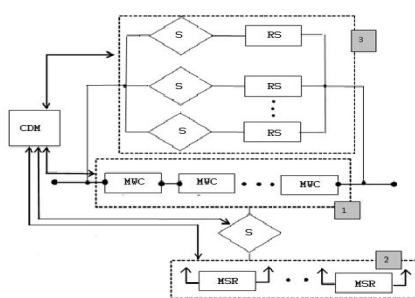


Fig.1. Configuration of fault-tolerant systems, build from the same type of modules with sliding and general redundancy.

1-Modules of working configuration of device  
2-Sliding redundancy,  
3-CDM – Control and diagnostics means, S-switch

For the reliable designing of such fault-tolerant system in reliability theory is the methodology of developing mathematical models, which is based on the highlighting of the random processes. But using this methodology in the process of design for solving problems with multiple choice analysis requires significant expenditures of time, which is unacceptable for the designer.

This paper uses improved simultaneous technology that will allow to automate the process of developing models as graph of states and transitions.

## INVESTIGATED SYSTEM AND THE REQUIREMENTS TO THEIR RELIABLE MODELS

At present it is difficult to imagine a radio technology system without the use of electronic control systems, which in turn must have a high grade of the reliability. Based on the use of such systems shows us that special attention should be paid to the reliability of such units, as: memory, power supply, disk memory arrays and cooling systems. There is designed the

model of server node memory, which allows to answer the following questions:

- What should be the reserve (a hot, lightweight, cold)?
- How many units should be in reserve for a given number of modules of the main system?
- How many repairmen per repair body should be provided to ensure effective repairs?
- What should be the relationship with the repairman (must be a permanently on site, to come to a site under a certain schedule or arrive to the site in time before Emergencies)?
- Which should be the turn modules to repairs for signal of the need to do repairs?
- What is the optimum time for a repairman to begin recovery work?
- Which should be the optimal number of backup systems?

After receiving answers to the above questions, we can offer a technical maintenance strategy and develop the optimum configuration of the server node memory depending on the purpose of the device.

Configuration, fault-tolerant systems (Fig. 1) used in the design of uninterruptible power supplies (UPS) consist of the power supply which is composed out of the same type of working configuration and the same module of the sliding reserve. Two batteries, for which the number of charges are provided, perform a general backup to the power supply. The control and diagnostic means are monitoring the power supply efficiency and localizing the faulty module in it, as well as controlling of batteries performance.

The first battery automatically connects to the load at the moment of power supply failure, or if the power supply is disconnected. The second battery is connected, when the first run-down, or is out of order. In the absence of electrical power the battery charger shall be loaded from the generator. Option to switch electricity supply / generator provides automatic switch.

When designing the following problems arising:

Definition of the impact on reliability UPS number of moving reserve units, such as batteries and generators at a given unreliable electricity supply;

Definition of permitted unreliability of the power supply at the given parameters UPS.

Development models of the memory node server and the source of the uninterruptible power supply as a fault-tolerant system with combined structural redundancy imposes certain features on their reliable models.

## REFERENCES

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