

Determining the performance of network functions by taking the example of PRP

Distributed systems whose communication channels are realized via Ethernet networks often require a high degree of reliability. One way to achieve this is the use of the «Parallel Redundancy Protocol» (PRP). The PRP protocol provides redundant data transmission via two entirely independent Ethernet networks.

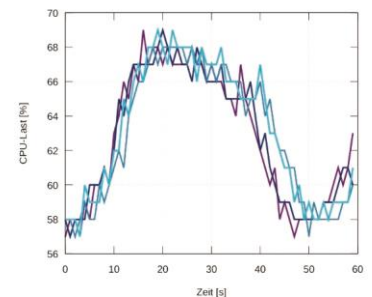
The main focus of this project is on the evaluation and application of appropriate measurement methods, as well as the interpretation of the results with regard to data transmissions which apply the PRP protocol. In a first phase, several testing scenarios, which address the special properties of the PRP protocol were defined. After extensive study and usage of existing applications, it has been stated that with regard to accuracy and evidence of measurement results, individually developed applications are to be preferred. Therefore two applications were developed, «shck», a network load generator and «meas», a software to capture and analyse measurement data.

In conclusion, the implementation of the PRP protocol can be said to operate stably for the most part and as expected. No impairments to the data rate at a data transmission speed of Fast Ethernet (100 MBit/s) could be detected. Nevertheless, depending on the data volume, an additional, not inconsiderable CPU load is usually registered while transmitting data. A migration of the of the PRP protocol implementation, currently running in user space, to a kernel module, and also optimization of the implementation regarding the communication between physical network adapters and the virtual PRP network adapter can reduce the additional CPU workload.

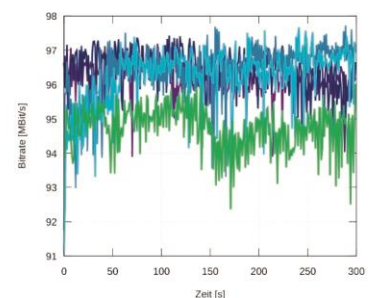


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Exemplary recording of the CPU load during a measurement series. The graphs represent the behavior of the CPU load under the influence of different factors.



Exemplary recording of the bitrate of a network interface during a measurement series. The graphs represent the behavior of the bitrate under the influence of different factors.