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THE MULTILEVEL DYNAMIC BANDWIDTH ALLOCATION AND PERFORMANCE ANALYSIS OF SPACEBORNE NETWORK BASED ON SPACEFIBRE

Abstract

The technology of optical fiber communication brings higher bandwidth to the spaceborne network, which makes more sensors and equipment can be successfully applied to satellites, spacecrafts and space stations. SpaceFibre is a new high-speed serial data link designed specifically for spacecraft onboard data communication, which runs over both electrical and fiber optic media and supports more than 2Gbit/s transmission rate. Due to the use of the protocol bridge, the SpaceFibre network can mount many subnets and devices for other protocols, so the SpaceFibre network can be divided into a multi-level network. SpaceFibre adopts a strict quality of service mechanism to guarantee the network bandwidth requirements, but the access of complex interfaces and subnets can bring some difficulties to the bandwidth allocation. If not handled properly, it will result in a waste of bandwidth resources or network conflicts and block. The effective allocation of bandwidth between the spaceborne optical fiber network and its access subnets and interfaces can gain a great improvement of network performance. Considering the bandwidth requirements of different levels in the network, a novel self-adaption algorithm using partial deep learning method is proposed to achieve dynamic allocation of bandwidth, and a network simulation software, OPNET is used to verify the validity of the algorithm. In the end, the results of throughput performance and transmission time are given, and the results of simulation experiments demonstrate that the bandwidth utilization of the whole network with this algorithm is improved by comparing the existing dynamic bandwidth allocation algorithms.