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MULTIAGENT PLANNING OF THE NETWORK TRAFFIC BETWEEN NANOSATELLITES AND GROUND STATIONS

Abstract

It is considered the group of nanosatellites which belong to different universities and companies (foe example, QB50 satellite network) interacting with a ground stations network. The main idea of issue is planning of effective transfering data from sattelites in network so that it will occured in concrete time and minimization of delay from filling memory of satellite.The system must adaptively adjust constructed the schedule of events for each station like: exit satellite failure, equipment failure station, a request from another organization to receive data from one of the satellites, the changing of satellites's program, etc. If one of the stations face with unforeseen events, station's tasks have to be redistributed among the other stations on the network. Stream of transmitted from each satellite data can be represented like work with a specific start time , completion time limit , volume and priority. Thus, the optimization issue can be reduced to the problem of scheduling (connection sessions) network resources (ground stations) . As the basis for the solution of this problem can be used multi-agent technology which can help to solve complex problems through self-organization of many interacting agents whose knowledge described by ontology [1]. Satellites and stations can be equipped with on-board autonomous multiagent system. For each satellite creates matching satellite agent, this agent generates agent of works. Satellites agent is aimed to plan own work to satisfying the established time limit for work. Each ground station is assigned a resource agent, whose goal is the most compact scheduling with preference scheduling of satellites of its own organization and ensuring minimize downtime. To account for the cost components introduced virtual market agents, in which all the characteristics of the processes and the objective functions are expressed through virtual cash equivalents. The final plan is constructed as a dynamic balance of interests of agents works which are negotiating about its position in the schedule resources and plan its executing using displacement, based on the tolerances of the commencement of the preferred time.