SPACE OPERATIONS SYMPOSIUM (B6)
New Operations Concepts, Advanced Systems and Commercial Space Operations (2)

Author: Mr. Xiaosong Gu
Xi'an Satellite Control Centre(XSCC), China, guxiaosongxscc@gmail.com

Mr. Jian Bai
Xi'an Satellite Control Centre(XSCC), China, baijianxscc@163.com
Mr. Chunze Zhang
China Xi'an Satellite Control Center, China, zcz1974@163.com
Mrs. Huili Gao
China Xi'an Satellite Control Center, China, xsccnmc@163.com

STUDY ON TT&C RESOURCES SCHEDULING TECHNIQUE BASED ON INTER-SATELLITE LINK

Abstract

Navigation constellation will have the capability of supporting Tracking Telemetry and Command (TTC) operations by inter-satellite link (ISL). The ISL will become an important solution to reduce the shortage of ground TTC resources. The problems need to be studied urgently in the field of space TTC network resources scheduling management are how to determine the availability of ISL and how to allocate TTC resources of ISL. The performance and scheduling constraints of navigation constellation's ISL are analyzed, and three utilization strategies of ISL to perform TTC operations are proposed. The allocation of TTC resources based on the ISL falls into two successive phases. Firstly, master satellite determination equation is established by using 0-1 Programming model based on the availability matrix. Mathematical method is used to solve the equation to determine the master Satellite and the topology of ISL. Secondly, Constraint Programming (CP) model is used to describe the ground TTC resources scheduling problem with special requirements of TTC operations based on master satellite, and a heuristic algorithm is designed to solve the CP model. The equations and algorithm are verified by simulation examples. The algorithm of TTC resources scheduling based on the ISL has realized the synthesized usage of both the ISL and ground resource on TTC field. This algorithm can improve TTC supports of territorial ground TTC network for global navigation constellation, and provides technical reference for the TTC mission planning of global constellation using the ISL.