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INTEGRAL AUTONOMOUS OPERATION OF GROUND SEGMENT AND SATELLITE

Abstract

China has launched and deployed its three Chinese Data Relay Satellites (CDRS) successfully until now. CDRS has greatly expanded the coverage of tracking stations for Chinese space missions across the globe as part of the country's space communications network. In order to achieve the autonomous operation of the whole space communications network, a novel automatic planning and operating approach has been designed and developed. This paper addresses a proposed schedule and integral management script method that is enable to set ground segment and control satellites automatically and simultaneously. The schedule resolves mission requirements to be TTC and data transmission events. The script is an innovated operation language similar to computer language, which transforms the TTC and data transmission events into a series of telecommands, pseudo-commands and validation criteria. It autonomously sends normal or emergency commands based on time, telemetry or pseudo-telemetry, etc. The presented method increases system efficiency and reduces mission routine staff greatly. An automatic and intelligent failure diagnostic and treatment approach is also presented. Firstly, a failure determination mechanism receives telemetry and pseudo-telemetry from satellites and ground equipments, and locates the failure part or instrument of the network. Then, accordingly a treatment mechanism allocates a proper measure is to deal with the failure situation. The diagnostic and treatment approach can be expanded to automatically make a recovery from any expected failure by adding new one in determination and measure library, according to knowledge of mission expert and experiences of the operation staff. It is demonstrated that the presented approach can keep the whole system in good health at almost.