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DESIGN AND IMPLEMENTATION OF GROUND AUTHENTICATION SYSTEM FOR CHOLLIAN  
SATELLITE**Abstract**

This paper is concerned with the development of Ground Authentication System (hereafter GAS) that implements the authentication function to be proposed to prevent any hacking of the telecommands data, which might occur when Real-time Operations System (hereafter ROS) sends telecommands to Chollian satellite. The GAS is satisfied with the main features standardized by European Space Agency (ESA), and is remotely communicated with ROS via Ethernet. Only authenticated commands generated through GAS are successfully received at the satellite, otherwise the commands aren't accepted by the satellite. Thus, even if the configuration of the command packet is exposed to the outside, the GAS can protect the satellite because the satellite doesn't execute the command if the command doesn't pass the authentication process. The GAS for Chollian satellite has been implemented to be controlled and monitored by ROS. An operator can set up authentication mode, Logical Authentication Channel identifier, and LAC counter on the ROS software. The ROS can issue authentication control commands to set up an authentication unit onboard. The GAS has both operational modes: local mode and remote mode. In local mode, it is possible to load the authentication keys and prepare the environment for GAS operation. The GAS can store and manage authentication keys for two on-board computers. It loads and manages the values of fixed key and programmable key for each on-board computer on the PC memory. In remote mode, the GAS practically authenticates telecommands by interoperating with ROS. This paper describes the design and implementation of the GAS, and presents the result of processing the authentication of telecommands through interfacing with ROS. The GAS has been already developed and confirmed by testing its functions, and it is being used to operate the Chollian satellite.