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Cyber-security threats to space missions and countermeasures to address them (4)

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SCOUT MULTITECH SECURITY SYSTEM FOR INTERCONNECTED SPACE CONTROL GROUND
STATIONS: THE SYSTEM ARCHITECTURE AND THE DEMONSTRATION SCENARIO

Abstract

The SCOUT (Multitech SeCurity system for intercOnnected space control groUnd staTions) project is based on the use of multiple innovative and low impact technologies for the protection of space control ground stations and the satellite links against physical and cyber-attacks, and for intelligent reconfiguration of the ground station network (including the ground node of the satellite link) in the case that one or more nodes fail.

The SCOUT high level system architecture is composed of the following subsystems:

MCU (Main Control Unit): this subsystem is devoted to the management, the display, and the identification of the actions to be performed when an attack is identified; in some cases the MCU can autonomously implement the identified reactions.

- Risk Assessment Unit: this subsystem is in charge of identifying the level of risk associated with the potential threats (cyber and physical ones);
- SENSNET: is a scalable multisensor network devoted to the protection of the space ground based station against physical attacks;
- CYBERSENS: is a distributed telecommunication network sensing system devoted to the protection/detection of the space ground based station against cyber-attacks;
- RECOVER: is a network management system devoted to the reconfiguration of the space control ground station network.

SCOUT Project foresees a demonstration activity with the demonstrator located at the ASI ("Agenzia Spaziale Italiana") CGS (Centro di Geodesia Spaziale, Geodesy Space Centre), at the coordinates

4038'57.4"N 1642'13.6"E, along the provincial road connecting Ginosa to Matera (Italy), close to the administrative border between the Italian southern regions of Basilicata and Puglia. Only a limited portion of all area, which spreads over about 40.000 square meters and is surrounded by a perimeter railing, will be used for the demonstrator.

For what concerns the physical security, the area covered with sensors is close to the Telespazio Space Centre, located on the southern side of the CGS. The two parts of the Centre share the parking and a segment of border railing.

The cyber security sensors will be instead located into a network with an ad-hoc developed Ground Segment emulator, in order to protect a service very similar to the real ones in the demonstration tests, but not involving the nominal operational activities.

Although the demonstration scenario is defined for the ASI infrastructures in Matera, the SCOUT demonstrator could be easily placed, with some minor modifications, in other ground stations, given the similarity between this kind of infrastructures.