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THE SENTINELS MISSION DATA SYSTEMS AND SECURE SPACE COMMUNICATIONS

Abstract

Over the years, the number of threats to a space mission's infrastructure has increased dramatically. As stakeholders rely on the availability of the mission products, the mission assets need to be protected from unauthorised access. To address the increased threat factor, most of today's missions specify security requirements for the communications link. The ESA Sentinels spacecraft constitute the first satellites responding to the Earth Observation needs of the GMES programme. In the case of the Sentinels, the need for Telecommand authentication and integrity has been a main design driver. All spacecraft are equipped with on-board units which ensure that no commands from any un-authorised source are accepted by the spacecraft. The introduction of security features into the communications link has clear impacts on all elements involved in the communication. The basic design approach of ESA for new missions is to apply standards as far as possible. It is obvious that certain considerations need to be taken in order to allow for secure communications while still in line with the underlying standard. Over the years, ESA has followed a strict re-use concept on the side of the ground data systems. The re-used generic components do not yet support secure communications and therefore need to be upgraded in this respect. In order to avoid problems with backward compatibility of software, special care has to be taken to ensure that the existing functionality implemented by the kernel remains mostly unchanged. The presentation focuses on all aspects of secure telecommanding introduced by the Sentinel spacecraft. The impact on the usage of the standard is addressed first, followed by the key aspects of the secure commanding. The operational concept of the Sentinel spacecraft is presented. Finally, the presentation shows the challenges faced on the side of the mission data systems and how they are addressed.