

SPACE OPERATIONS SYMPOSIUM (B6)
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AUTOMATED PROCEDURE BASED OPERATIONS FOR THE EUROPEAN DATA RELAY SYSTEM

Abstract

The European Data Relay System (EDRS) provides a high speed data link between ground stations and satellites in low earth orbit. Up to 400 links per day are foreseen to be commanded by the ground-system established at DLR's German Space Operations Center. The high command load is beyond the capabilities of a classical operational concept with manual operations. Therefore an automated system has been established at the Devolved Payload Control Center, with human interaction only necessary following a contingency either in the ground processing or the space segment.

Spacecraft operations are based on Flight Operations Procedures (FOP). These FOPs include all telecommands necessary to command the spacecraft, all telemetry parameters to be verified and additional information such as expected behavior, optional breakpoints and operational criteria. In a classical operational concept, the command release system and the telemetry verification system are often used separately, even if they are integrated into the same system, as it is the case with SCOS-2000. The telecommands are loaded into a stack and are sent by single access, while the telemetry is verified by human observation on a separate display system. For the Devolved Payload Control Center an automatic command and control system to operate the EDRS-A payload in its routine operations phase has been developed.

This innovative system commands the payload during nominal operational conditions entirely without human interaction. It uses the same input FOPs as the classical concept but executes the whole procedure at once. This new concept is the first step towards a procedure based operation. Furthermore, this system is used with the EDRS-A payload for manual FOP execution. In this use case the system provides the procedure to the user who executes it step by step.

For the routine phase of the upcoming EDRS-C mission this concept will be further developed to provide a complete procedure based interface to the spacecraft controller combining commanding and verifying of entire procedures in one single entity. This new concept will increase the situational awareness while at the same time providing more automation. It will include automated, manual, as well as a semi-automated operation concept focusing on decision breakpoints and automation in between.

The upcoming paper will present the existing procedure based operations for EDRS-A and experiences gained with this concept during the first year of the mission. It will furthermore present the planned way ahead in procedure based operations for geostationary missions at DLR GSOC.