

SPACE OPERATIONS SYMPOSIUM (B6)  
Training Relevant for Operations (3)

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MAX - A NEW SYSTEM FOR GROUND STATION OPERATORS TRAINING

**Abstract**

As the utilisation of the operational ground station network increases, the availability of ground stations for validation of the operational tailoring and for training of ground station operators decreases. This leads to a situation where operators can no longer be efficiently trained for routine operations or specific recovery and contingency cases. The new Ground Station MC Simulator (MAX) has been developed by VEGA for ESA in order to provide a valuable alternative solution for operator training and tailoring validation when stations are unavailable.

The Ground Station MC Simulator (MAX) is a simulator that implements the ESA Ground Station MC interface between the Ground Station Monitoring and Control System (GSMC) and the ground stations subsystems, and simulates part of the ground station subsystems functional behaviour. MAX is based on generic simulation models, and allows, the use of configurable items and script development to simulate any ground station subsystem supporting the ESA Ground Station MC interface. The fidelity of the simulation is in addition increased by providing specific subsystem equipment models replicating the exact behaviour of the ground station systems.

MAX provides the trainee a realistic view of a complete ground station, by simulating the signal processing and data handling processes in the ground station. Not only are the equipments simulated, but also the interactions between them in order to provide a realistic consistent view of the ground station. The system also allows non nominal training by error injection at several levels, in order to train the operators for such un-expected situations.

A set of training scenarios have been carefully defined together with MAX, which identify the sequence of events, the actions the trainee should take, and the data the simulator provides to the trainee. These scenarios train operators for various cases, from routine operation, e.g. "Configure PER for XMM" to contingency recovery cases, e.g. "MEX Safe Mode Recovery over NNO". For each of these scenarios, the level of fidelity must be of high quality. MAX can also be used for the development of ground station tailoring, and training of the operator on these specific tailorings. For this purpose, MAX provides specific features like error injection, test automation, automatic initialisation, configuration changes at runtime, test evaluation support.