Flight Dynamics operations automation: experience on a large fleet of heterogeneous GEO satellites

Eduardo Bellido – EUTELSAT
M. A. Molina – GMV

EUTELSAT, S.A. - 70 rue Balard, F 75502 Paris Cedex 15, (France) ; Tf : +33 1 5398 4747
GMV – c/ Isaac Newton, 11; PTM Tres Cantos 28760 Madrid (Spain) Tf: +34 918072100

Active for over 25 years in the field of commercial satellite communications, EUTELSAT owns one of the youngest and largest fleets in the world. The high number of satellites and the variety of buses are major issue taken into account for routine satellite operations definition, implementation and execution. The need for robust, safe and efficient facilities are basic requirements for EUTELSAT Flight Dynamics operations. In this sense the facilities have contributed to the high success of EUTELSAT satellite operations and service reliability.

As part of the identified needs, the capability for automation of routine operations is a major requirement in order to minimize the risk and assure a safe, efficient and flexible implementation of these operations. In this sense the Autofocus tool is part of the Flight Dynamics facilities since 2002. It is a solution delivering automation support to the operational flight dynamics systems. It permits the Flight Dynamics Engineers to run the different procedures, to plan and to assess manoeuvres for the full satellite fleet.

Autofocus is fully compatible with today’s operations based on procedures, but replaces the human operator by an agent that handles procedures written in SOL, the Spacecraft Operations Language. This is a very high-level language that has been specifically adapted to support flight dynamics procedures. Oriented towards spacecraft operators (not programmers) it integrates natural language-like syntax in which the number of language elements has been minimized. SOL is also a procedural language which features numeric, text, Boolean and date (relative and absolute) data as well as list handling. A rich set of mathematical (trigonometric and hyperbolic functions, logarithms, power, …) and logical expressions (equal to, less than or equal to, logical and, or and not, …) are available. Date expressions and arithmetic operations are also supported.

EUTELSAT Flight Dynamics Engineers are using this system daily since 2003 to prepare the typical FD operations: manoeuvre planning including satellite telecommands, assessments, fuel book keeping, pre-processing of tracking, dissemination of data, etc. This paper presents the assessment of the experience of FD operations using Autofocus.