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EPS PROGRAMME STATUS

This document presents the status of the EPS programme as of end of September 2002.

EPS PROGRAMME AND DEVELOPMENT STATUS

1 PROGRAMME SCOPE AND COOPERATIONS

The EUMETSAT Polar System (EPS) is the European contribution to the Initial Joint Polar System (IJPS) established with NOAA, and the first European contribution to the follow-up Joint Polar System (JPS) expected to be formed with the US "Converged" NPOESS system. The IJPS and JPS will provide global meteorological and climate data from a series of European and American sun-synchronous polar orbiting satellites, replacing the current NOAA K-L-M series.

EPS is an end-to-end system dedicated to the acquisition, processing and dissemination of observational data from the morning orbit. It provides also capabilities for cross-support and data exchange with the NOAA POES system which covers the afternoon orbit service. The EPS system is composed of a space segment, based on three successive Meteorological Operational (Metop) satellites, and a ground segment. The application component of the ground segment that will generate a variety of level-2 products, is based on the combination of central facilities and a distributed network of satellite applications facilities developed and hosted by several EUMETSAT Member States.

The first Metop satellite (Metop-1) is being developed in the framework of the Metop-1 Programme of the European Space Agency (ESA), in co-operation with EUMETSAT. The development and procurement of the three Metop satellites is under the responsibility of a joint ESA-EUMETSAT Single Space Segment Team. In addition, EUMETSAT is directly responsible for the delivery of the MHS, IASI, ARGOS-DCS, AVHRR/3, HIRS/4, AMSU-A and SEM payloads. MHS is directly procured from industry, while the IASI advanced infrared sounder and ARGOS-DCS are procured through Centre National d'Etudes Spatiales (CNES). The other instruments are contributed by NOAA, under the IJPS co-operation agreement, which covers also the establishment and operation of the IJPS and provision of MHS instruments to be flown on NOAA N and N'.

The EUMETSAT EPS Programme is the legal framework for the development and implementation of the EPS System. Its financial envelope covers contributions to the development of the Metop-1 satellite and the IASI-1 instrument, co-funded by ESA and CNES, respectively. It also covers other major procurements including those of the MHS sounders to be flown on the NOAA-N, N' and Metop satellites, two recurring Metop satellites and IASI instruments, three launch services and the EPS Ground Segment. Last but not least, it covers operation of the EPS System over 14 years.

EUMETSAT has established Co-operation Agreements with ESA, for the development and procurement of the three Metop satellites; with NOAA, for the exchange of instruments, data and operation cross-support; and with the CNES, for the provision of IASI and ARGOS-DCS payloads.

2 PROGRAMME STATUS

The ESA Metop-1 Programme and the EUMETSAT EPS Programme, which form the basis for the development, implementation and operations of the EPS System as part of the IJPS, were approved in 1998 and 1999, respectively.

Within EPS, all Cooperation agreements and relevant management implementation documents have been agreed and signed off with the concerned Organisations, namely ESA, NOAA and CNES.

Further to the revision of the EPS schedule (nominal launch date in July 2005), several iterations with NOAA were conducted in order to analyse the impacts of the new situation. NOAA launched NOAA-M in June 2002. With an expected 45-month lifetime of NOAA-M and a launch of the first Metop satellite in 2005, there should be no (or little) gap in the morning orbit service.

All major Contracts for the Space Segment, the Launcher and the Ground Segment were signed and respective developments are well underway. The Launch and Early Orbit Phase (LEOP) service Contract is planned to be kicked off at the end of September 2002.

3 EPS DEVELOPMENT STATUS

3.1 System

The system Wrap-up Preliminary Design Review took place in March 2002. The Review was considered successful, leading to the closure of the Programme-level Phase B.

The team is now preparing the system Critical Design Review (CDR). It is planned to organise the Review in two steps. In early 2003, the Core CDR will be organised while some specific elements (Services and elements from Overall Ground Segment) that are less schedule critical would be covered in a second step towards the end of the year 2003.

A major effort was related to the definition of the development processing baseline i.e. for each processing chain, the Product Generation Specifications (PGS), Product Format Specifications (PFS) and corresponding test data.

The Verification and Validation activities focused on:

- the definition of the System integration activities
- The scope of the detailed test cases for the Satellite System Validation Test (SSVT);
- The EPS Calibration and Validation Plans, in cooperation with Partner Agencies,
- The definition of the task and logic of activities during the EPS (including Metop) commissioning

3.2 Space Segment

The Metop satellite is a 4.3-ton class satellite carrying a payload of about 900 kg. Its orbit is sun-synchronous with an inclination of 98.7 ^{o} and an Equator local crossing time at 09.30 hrs. It communicates with ground in S, L and X bands, for command and control, local (direct broadcast) dissemination and global acquisition.

The Metop-1 industrial activities started in 1998 and have been proceeding normally since then. EUMETSAT and the Single Space Segment Team (SSST) have formally introduced the revised schedules of the Customer Furnished Instruments to Metop Industry and are negotiating a related contract change.

Following the MetOp Structural Model programme (SM) concluded in May 2001, several actions were undertaken to ensure the mechanical compatibility of the AVHRR instrument. Characterisation tests of the AVHRR instruments were conducted by NOAA/NASA and local modifications were implemented to ensure compatibility with the Soyuz launcher environment.

The Metop Engineering Model (EM) testing was completed on schedule at the end of August 2001. The Metop Satellite Critical design Review (CDR) was successfully completed in October 2001.
The integration of the Protoflight (PFM) Payload Module (PLM) is almost complete with residual activities relating to the replacement of EM instruments used for the initial integration and testing activities, with their flight replacements (eg. AVHRR and GRAS).
These activities will be completed by early September 2002 when final system testing will commence, including Thermal Vacuum testing to be performed at ESTEC in October/November 2002.

In parallel with these activities integration (and test) of the FM2 PLM avionics has been successfully completed.
With respect to the Service Module (SVM) the PFM is now fully integrated and initial system reference testing has commenced with a preliminary version of the Central Flight Software. The SVM will undergo Thermal vacuum and EMC testing at Intespace prior to satellite integration (with PLM) which is scheduled in march 2003.

Some technical problems have been encountered on the IASI development, leading to a delay in the delivery of the instruments to Metop. The overall schedule was re-worked leading to a delivery end of summer 2003 at a date compatible with the Metop schedule. Following the completion of its subsystem CDR's, the IASI instrument level CDR was held in May 2002 and authorisation to proceed with the manufacturing of the flight model was given to Industry .

The MHS Proto-Flight Model (PFM) instrument has been integrated to the NOAA-N spacecraft and the thermal vacuum test in currently underway. The MHS Flight Model 2 (FM2) instrument is integrated to NOAA-N' awaiting environmental testing. The MHS FM3 instrument has been successfully completed all testing after repair to fix a radiometric anomaly problem. The instrument is awaiting formal hand over to Metop industry. The MHS FM4 instrument has been integrated on MetOp Proto-Flight Model

Payload Module (PFM PLM). Preparations were made for the upcoming TV test. The MHS FM5 instrument and strategic spares (FM6) manufacturing is proceeding nominally.

3.2 Ground Segment

The EPS Overall Ground Segment (OGS) is composed of the Core Ground Segment (CGS), which performs the acquisition, control, pre-processing and dissemination functions, and additional facilities, including the U-MARF multi-mission archiving facility, the network of Satellite Applications Facilities (SAFs) and external support facilities, e.g. for external calibration / validation.

The CGS is procured as an end-to-end system from a Prime Contractor (Alcatel Space Industries) leading a European industrial consortium. The CGS contract was kicked off in January 2001. The current CGS detailed design phase will be concluded with the formal Critical Design Review (CDR) close out planned in October 2002.

The Polar Site Infrastructure Service in Svalbard successfully completed its Verification Review in May 2002 and was declared ready for the installation of the EPS antennas and electronics equipment. Transportation, assembly and erection of both EPS antennas and radomes was completed by early August, well within the available “weather window” at Svalbard. This marked a major milestone in the progress of the EPS ground segment.
Considering that the NPOESS Programme will also use the Svalbard site, activities are coordinated with the NPOESS team whenever appropriate to establish optimum synergism.

The contract related to the provision of the Launch and Early Orbit Phase (LEOP) and Telemetry, Tracking and Command (TTC) network service is planned ot be kicked off in September 2002. The development of the Back-Up Control Centre site infrastructure is underway.