

CGMS-XXX EUM-WP-05
Prepared by EUMETSAT
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STATUS OF PREPARATION OF MSG

This paper reports on the current MSG programme development status including commissioning activities and plans for initial dissemination of images and products. CGMS members are invited to take note.

STATUS OF PREPARATION OF MSG

1 INTRODUCTION

An overview of the mission objectives and basic capabilities of the MSG system was presented in a previous paper (Reference (1): CGMS-XXV EUM-WP-04). The development status was also presented and kept updated in the successive releases of this paper. The status of the development programme in September 2002, the plans for commissioning activities and initial dissemination are presented in this report. Finally, the actual plans for the transition from Meteosat to MSG are addressed.

2 MSG - MISSION OBJECTIVES AND CAPABILITIES

The Mission Objectives were already highlighted in Ref. (1) and summarised in Table 2 (see Annex 1). The End Users Requirements Document (EURD) has been recently updated to reflect the updated contents of the Low Rate Information Transmission (LRIT) and High Rate Information Transmission (HRIT) already described in the previous issue of this document: they are included in Table 3 of Annex 1.

3 STATUS OF SPACE SEGMENT

The cooperation with ESA for the procurement of the space segment is governed by a Programme Implementation Plan (PIP) which was signed in December 1997, covering the three satellites, MSG-1/2/3.

Following the final preparation activities, MSG-1 was successfully launched on August 28 at 22.45 UTC. Ariane-5 performed a very accurate injection into orbit and the initial data indicate that the launch environment remained within specifications for MSG-1.

ESOC took over control of the satellite after separation and successfully performed the manoeuvres necessary to place the satellite into a quasi-geostationary orbit, drifting slowly towards the commissioning longitude (10.5° West). All the nominal units of the satellite platform are working fine and, after the satellite went successfully through eclipses, the SEVIRI protective covers were jettisoned and the SEVIRI launch-locking device was released.

After a successful Commissioning Readiness Review, EUMETSAT took over control of the spacecraft on 25 September 2002, as planned. The satellite commissioning started at the beginning of October, with Platform tests, followed by the Mission Communication tests. Activation of SEVIRI is planned before end of October 2002.

The MSG- 2 satellite remains in storage until the launch of MSG-1 and preparation for environmental tests has now started. At the end of the integration and test phase MSG-2 will then put into storage with a Pre-storage Review planned in summer 2003. The tentative launch date of MSG-2 has been re-scheduled to January 2005, in consideration of the extended lifetime of the METOSAT 7 satellite. MSG-3 is also in storage.

The on ground tests of the MSG-1 Satellite Flight Model conducted in the past confirmed the very promising results of the SEVIRI performances measured at instrument level. In a

previous issue of this document (CGMS-XXIX EUM-WP-04) the expected in-orbit radiometric performances were indicated as per Table 1 below. The short-term error (or noise) requirement includes all factors affecting the radiometry during one nominal repeat cycle (15 minutes duration). It applies to in-orbit conditions at End Of Life (EOL), based on satellite tests (on ground) complemented by a prediction of in-flight performances at EOL on a “worst case” basis.

Channel	Short term radiometric error Performances	Short term radiometric error requirements
HRV	0.63 at 1.3 W/(m ² sr μm)	1.07 at 1.3 W/(m ² sr μm)
VIS0.6	0.27 at 5.3 W/(m ² sr μm)	0.53 at 5.3 W/ (m ² sr μm)
VIS0.8	0.21 at 3.6 W/(m ² sr μm)	0.49 at 3.6 W/(m ² sr μm)
NIR1.6	0.07 at 0.75W/(m ² sr μm)	0.25 at 0.75 W/(m ² sr μm)
IR3.9	0.17K at 300K	0.35K at 300K
WV6.2	0.21K at 250K	0.75K at 250K
WV7.3	0.12K at 250K	0.75K at 250K
IR8.7	0.10K at 300K	0.28K at 300K
IR9.7	0.29K at 255K	1.5K at 255K
IR10.8	0.11K at 300K	0.25K at 300K
IR12.0	0.15K at 300K	0.37K at 300K
IR13.4	0.37K at 270K	1.80K at 270K

Table 1: EOL Noise equivalent radiances and temperatures for the channels of the SEVIRI instrument on MSG-1 compared with the requirements. Values are obtained from testing at satellite level complemented by a prediction of in-flight performances at EOL. For the thermal IR channels they refer to a focal plane temperature of 95K.

4 STATUS OF GROUND SEGMENT AND SYSTEM READINESS

A staggered development approach for the Ground Segment was defined and implemented to overcome delays in finalisation of critical facilities. A Ground Segment Version 0, based on the Initial version of the Image Processing Facility (IMPF) and on the Image Quality Ground Support Equipment (IQGSE) for image rectification and a subsequent Version 1, based on the Final Image Processing Facility have been planned. After successful integration of the Ground Segment Version 0, its formal System Engineering Validation (SEV) phase was completed by mid-July 2002 and followed by the hand-over of the Operational Environments of this GS V0 to the Operations Preparation Team. This team has completed Operation System Validation (OSV) tests, in time for the hand over of the spacecraft to EUMETSAT.

The required enhancements of the IQGSE plus some dedicated implementation to relay data and images to the Ground Segment facilities are in progress according to plan. They will be integrated into the Ground Segment Version 0 before end of this year, allowing for the establishment of an Initial Image Processing Capability (IIPC) by early January 2003.

Integration and verification/validation of the MSG GS V1 will be performed after the delivery of the final IMPF starting early next year.

The readiness of the minimum MSG system required to support launch and satellite commissioning tests was achieved according to the plan established at the Minimum System

Readiness Review conducted from December 2001 to March 2002. The performance of operational scenario tests with the Ground Segment V0 was then nominal, all missions and commissioning scenarios have been performed successfully and the training of operators was conducted according to plan.

Plans have been established for the start of an initial data service in parallel with the Ground Segment Version 1 finalisation and commissioning activities. Dissemination trials will start by mid January 2003 with the first image data expected to become accessible to High Rate User Station (HRUS) / Low Rate User Station (LRUS) users in this timeframe and will continue throughout the commissioning phase until December 2003.

The availability of test data during MSG commissioning is currently planned as follows:

Milestone	Current Planning	Possible data (non regular)
Spacecraft Hand Over + 2 weeks (Intermediate)	Mid October 2002 November/December 2002	First HRIT/LRIT bit-streams Foreign Satellite Data Service Images (GOES and GMS)
Spacecraft Hand Over + 3 months	end December 2002	SEVIRI Level 1.5 images

The following should be noted:

- The spacecraft will be located at 10.5°W (+/- 0.4deg) for satellite commissioning.
- Due to the high initial inclination of MSG-1, during the initial dissemination users may experience reception outages, decreasing with time until spring 2003.
- In October, EUMETSAT will provide users (via web page) with antenna pointing information.
- Updated information on the test dissemination schedule will be available on dedicated EUMETSAT web pages.
- Actual dissemination will take place only when compatible with other commissioning activities.

An overview of commissioning activities and initial dissemination plans is presented in Figure 1. The MSG-1 satellite will be re-located to 0° longitude in early December 2003, and then routine operations will commence. It has been decided to call it METEOSAT 8.

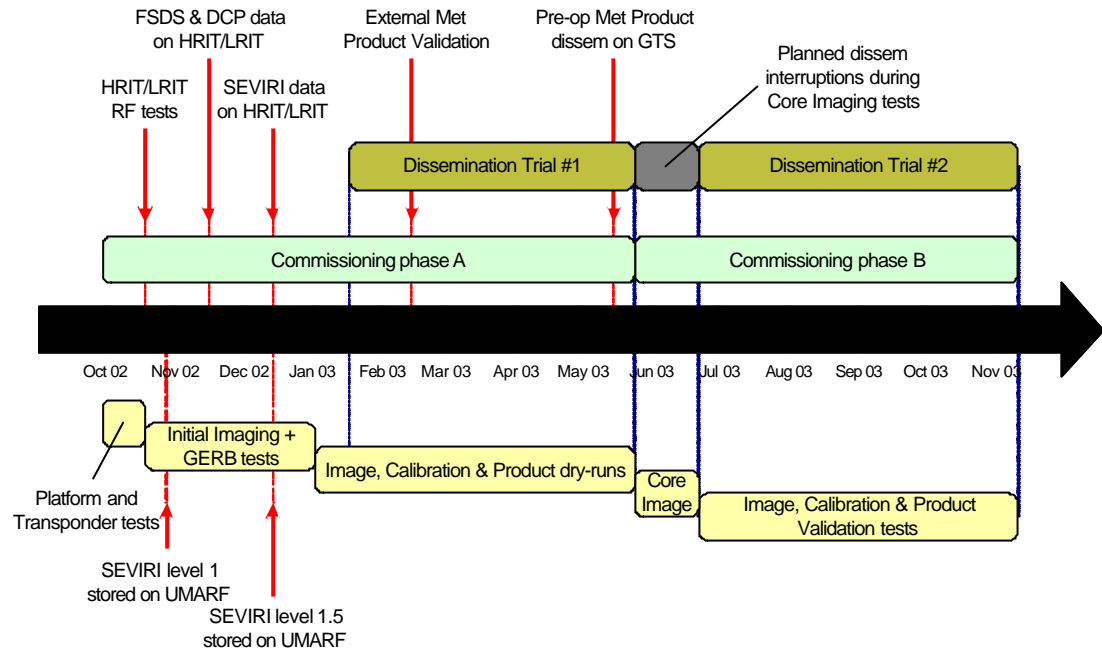


Figure 1: Overview of commissioning activities and initial dissemination plans

5 TRANSITION OF SERVICES

The transition period with parallel operations of Meteosat-7 and MSG-1, starting from the commissioning of MSG-1 has been extended until the end of 2005. It is planned to continue MTP routine operations from around 10° West (MET 7) and 10° East (MET 6), assuming it will be possible to operate on a non-interference basis, in a similar manner to the IODC Service at 63° East.

Table 2: Mission Objectives Overview

Mission	Characteristics	Note
<u>Imaging</u> For basic imagery, airmass analysis, high resolution imagery	<u>Channel</u> HRV VIS0.6 VIS0.8 IR1.6 IR3.9 WV6.2 WV7.3 IR8.7 IR9.7 IR10.8 IR12.0 IR13.4	<u>Spectral band</u> Broad Vis.* 0.56-0.71 0.74-0.88 1.50-1.78 3.48-4.36 5.35-7.15 6.85-7.85 8.30-9.10 9.38-9.94 9.80-11.80 11.00-13.00 12.40-14.40
	<u>Imaging area</u> Visible and infra-red channels: Full earth disc from geostationary orbit High-resolution visible: full North-South scan of earth disc; (adjustable) half earth disc in East-West	
	<u>Sampling distance (at sub-satellite point)</u> Visible channels: 3 km Infra-red channels: 3 km High-resolution visible: 1 km	
	<u>Image repeat cycle</u> 15 minutes full earth disc	
	Data Dissemination <u>High Rate Information Transmission (HRIT)</u> 1000 kbps of full image data, products, DCP and foreign satellite data etc.; lossless compression envisaged; encryption possible Reception with dedicated user station of minimum 12 dB/K <u>Low Rate Information Transmission (LRIT)</u> 128 kbps of reduced image data, products, DCP and foreign satellite data etc.; lossy compression envisaged; encryption possible Reception with dedicated user station of minimum 5 dB/K	
	Data Collection 210 regional channels (high band) 40 international channels up to 210 regional channels in the band of neighbouring satellite systems (as contingency; low band)	received and processed received and processed satellite relay only
	Product Extraction Key products extracted centrally, e.g. - Atmospheric Motion Vectors (AMV) - Cloud Analysis (CLA) - Cloud Top Height (CTH) - etc.	Further products developed and extracted in de-central facilities
	Secondary Payloads <u>Scientific GERB instrument</u> Global earth radiation coverage in three bands every 2.5 min; full data set to noise spec. every 15 min <u>GEOSAR message relay</u> Reception of distress signals at 406 MHz from most of the earth disc and downlink on 1544.5 MHz	Accommodation approved Accommodation approved

Table 3: Baseline for HRIT and LRIT dissemination

<p>The current baseline can be summarised as:</p> <ul style="list-style-type: none"> - HRIT containing the full set of SEVIRI image data (lossless – apart from HRV); - LRIT containing the full set of Foreign Satellite Data (lossless), a subset of lossy SEVIRI image data, DCP data, MDD data and meteorological products. 			
<p><i>In more detail the data content of LRIT and HRIT is:</i></p>			
LRIT	HRIT		
SEVIRI 1.5	SEVIRI 1.5		
VIS (0.6)	Lossy (30 mins)		
IR (6.2) WV	Lossy (30 mins)		
IR (10.8)	Lossy (30 mins)		
[NIR (1.6)]	Lossy (30 mins)*		
[IR (3.9)]	Lossy (30 mins)*		
<p>All channels lossless (apart from HRV) full Earth disk, 15 mins</p>			
		<p>Foreign Satellite Data Lossless 3-hourly Images (full set)</p>	
		<p>Meteorological Products** MPEF AMV MPEF CTH MPEF CLAI</p>	
		<p>DCP** All DCP data</p>	
		<p>MDD** All MDD Data</p>	
<p><i>Summary of differences with respect to previously agreed baseline:</i></p>			
<p>HRIT</p> <ul style="list-style-type: none"> - SEVIRI 1.5 data: no change (just more space for uncertainty in compression factor) - FSD: moved to LRIT - Meteorological Products: moved to LRIT - DCP: moved to LRIT - Bulletins from GTS (i.e. MDD): moved to LRIT 			
<p>LRIT</p> <ul style="list-style-type: none"> - SEVIRI 1.5 data: 3 of original 5 channels unchanged / 2 of original 5 channels to be included if space available - FSD: now full set and lossless (transferred from HRIT) - Meteorological Products: augmented set from HRIT - DCP: no change - MDD: no change 			

* Denotes channels to be included if space is available

** DCP, MDD and Meteorological Products could be moved back to HRIT if the 3 core SEVIRI channels on LRIT cannot be accommodated