MTG overview
• **MTG is a six-satellite system of**
  - 4 imaging satellites
  - 2 satellites equipped with atmospheric sounders.
  - Within the system the satellite contract covers the on-ground delivery of the six satellites
  - First imaging satellite to be delivered in 2017 – First MTG-S delivered in 2019
  - The following satellites will be produced in series (about one per year) and stored on ground for several years before being launched

• **European Space Agency ESA (Procurement Authority)**
  - ESA will be the development and funding agency for both the basic technologies and the two first satellites of the MTG system, and will also be the overall procurement agent for the four recurrent satellites

• **EUMETSAT (End User)**
  - Eumetsat defines the requirements for each mission and is responsible for the overall programme. Eumetsat will fund 100% of recurrent satellites, the ground segment, the launch services as well as all operations.
MTG Imaging Satellite – MTG-I (4 satellites):
- The Flexible Combined Imager (FCI),
- The Lightning Imager (LI),
- The Data Collection System (DCS) and Search and Rescue Payload (GEOSAR).

MTG Sounding Satellite – MTG-S (2 satellites):
- The Infrared Sounder (IRS),
- The Ultraviolet, Visible and Near-Infrared sounder (UVN) as part of the GMES Sentinel 4 program.
Development approach

Satellite level

- MTG-I and MTG-S satellite STM’s, based on a single common platform, and two consecutive payload configurations
  - Structural and thermal items are flight representative
  - Electronic units represented by mass and thermal dummies
  - Highly representative instrument STM going to sun-vacuum testing

- Avionics bench for avionics validation

- MTG-I and MTG-S integrated satellite EM
  - Based on flight representative units (with MIL std EEE parts)
  - The instruments then satellite EM have to withstand vacuum testing

- MTG-I and MTG-S satellites PFM’s and recurrent models

- Recurrent Equipments, main assemblies and satellite are produced in series, then stored on ground before launch (up to 10 years storage for the satellite)

Equipment qualification models

- Where relevant equipment or sub-assembly qualification models

- Potential reuse of these models as flight spare or flight model if flight-worthiness is demonstrated
## Programme Master Schedule

### Program Timetable (dates to be shifted by 1 year in the figure)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Dates</th>
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<tbody>
<tr>
<td>Phase A</td>
<td>2006-2007</td>
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<tr>
<td>Phase B1</td>
<td>2008-2009</td>
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<td>1st Satellite Launch</td>
<td>2017</td>
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<tr>
<td>End of Life</td>
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---

---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KOM | SRR | PDR | FCUL1 | CDR | CDR-H | CDR-S | CDR | QR | MTG-J STIM | MTG-I STIM | MTG-I EM | MTG-S EM | PFM AIT MTG-I | PFM AIT MTG-S | FMI-1 | FMI-2 | FMI-3 | FMI-4 | FMI-5 |
| KOM | PDR | STIM | EM | PFM | PFM-S | FMI-1 | FMI-2 | FMI-3 | FMI-4 | FMI-5 | FMI-6 | FMI-7 | FMI-8 | FMI-9 | FMI-10 | FMI-11 | FMI-12 | FMI-13 | FMI-14 |

### MTG development schedule

- **KOM**: Kick-Off Meeting
- **SRR**: System Requirements Review
- **PDR**: Preliminary Design Review
- **FCUL1**: Functional Coupling Unit Level 1
- **CDR**: Critical Design Review
- **CDR-H**: Critical Design Review-Height
- **CDR-S**: Critical Design Review-Safety
- **QR**: Qualification Review
- **MTG-J STIM**: MTG-J System Test and Integration Milestone
- **MTG-I STIM**: MTG-I System Test and Integration Milestone
- **MTG-I EM**: MTG-I Environmental Management
- **MTG-S EM**: MTG-S Environmental Management
- **PFM AIT MTG-I**: Preliminary Functional and Mechanical AIT MTG-I
- **PFM AIT MTG-S**: Preliminary Functional and Mechanical AIT MTG-S

---

**Prime and Satellite**

- **KOM**: Kick-Off Meeting
- **PDR**: Preliminary Design Review
- **STIM**: System Test and Integration
- **EM**: Environmental Management
- **PFM**: Preliminary Functional and Mechanical
- **FM**: Functional Management
- **FM2**: Functional Management 2
- **FM3**: Functional Management 3
- **FM4**: Functional Management 4

---

**Platform**

- **KOM**: Kick-Off Meeting
- **PDR**: Preliminary Design Review
- **STIM**: System Test and Integration
- **EM**: Environmental Management
- **PFM**: Preliminary Functional and Mechanical
- **FM**: Functional Management
- **FM2**: Functional Management 2
- **FM3**: Functional Management 3
- **FM4**: Functional Management 4

---

**MTG development schedule**

- **FMI-1**: Functional Management 1
- **FMI-2**: Functional Management 2
- **FMI-3**: Functional Management 3
- **FMI-4**: Functional Management 4
- **FMI-5**: Functional Management 5
Core team Industrial organisation
Mission Requirements
ESA / EUMETSAT

MTG-I Mission Prime
TAS

MTG-I FCI
Instrument Prime
TAS

Telescope Assembly
KT

MTG-S Mission Prime
OHB-System

MTG-S IRS
Instrument Prime
KT

Interferometer Assembly
TAS

MTG Core team
Technical synthesis and main drivers
Main Technical Challenges

**MTG-I**

- Significantly higher performances than MSG, similar to GOES R
- Transition from spinner to 3 axis concept
  - Solar entrance in instrument cavity
  - Two axis scanning
- IR perfo requires active cooling at 55 K
- Main technical challenges: attitude measurement & pointing stability, compensation of scan motion by reaction wheels, INR, LWIR detectors, scan mechanism, active cryocooling, instrument thermal architecture (sun effect), micro vibrations & other attitude perturbations

**MTG-S**

- First Geo IR sounder of this class in the world (NOAA has stopped the GOES R sounding mission (HES))
- Many technical challenges solved on MTG-I
- IRS FTS concept derived from IASI
- Huge data rate (3 GBps at instrument output) / real time acquisition and processing
- Pointing stability over 10 s
MTG-I performances step vs MSG

- Higher resolution: 0.5 to 2 km instead of 1 to 3 km
- 16 more accurate spectral bands instead of 12
- Repeat cycle 10 min instead of 15 min
- Data rate around 60 Mbit/sec instead of 3 Mbps
- More challenging INR requirements, combined with 3 axis stabilization introduction
MTG-I and S configuration

- UHF antenna
- FCI
- LI
- Ka-band antenna
- L-band antenna
- IRS
- S4/UVN
- Ka-band antenna
- Xs
- Zs
- Ys
FCI Overview & Budgets

**FCI Main Budgets**

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<td><strong>Data Rate (Mb.s⁻¹) max</strong></td>
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Corporate Communications

MTG-TAF-

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### IRS Main Budgets

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<td>Power (W) nom / max</td>
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<td>Data rate Mbps</td>
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---

**Thales Alenia Space**

Corporate Communications

MTG-TAF-
MTG product tree : BP items
Thales Alenia Space - France is responsible for the Industrial Team build-up which is performed in two steps:

1. The selection of the Core Team members already performed during the proposal preparation as requested in the ESA ITT

2. The selection of the Suppliers for H/W, S/W, engineering and GSE will be performed by the “issuing companies” starting in December 2010 with the aim to be finalised up to the PDR (for the majority of the procurement items)
The industrial consortium will be completed during the phase B2 through a selection procedure in line with ESA Best Practices and presented before. The main objectives of this selection process are:

- To achieve technically excellent solutions,
- To minimise the schedule risks,
- To achieve cost effective solutions,
- To ensure maximum level of competition,
- To comply with the geographical distribution objectives.

The list of items to be sub-contracted is identified and contains more than 115 items

All the fields of work are covered
OHB procured items

MTG & MTG-I Prime TAS

MTG-S Prime OHB

Platform OHB

OHB procured items

Structure
- Central tube
- other structural items

Power
- conditioning & distribution
- SADM
- battery

Data Handling

Harness

AOCS
- Star Trackers
- Gyros
- Reaction Wheels
- Coarse Rate Sensor
- Coarse Sun Sensor

TTC S/S
- TTC Transponder
- TTC antenna

Payload Data Distribution
- Data Distribution Unit
- Ka Transponder
- Ka Antenna

Thermal Control

GSE’s

Corporate Communications
MTG-TAF-

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MTG

MTG Best Practice : generic information
Industrial organisation build-up 1/4

- **ESA requirements**: Core team for all blocks below 40%

- Industrial consortium shall be built-up according to ESA best practises rules, with open competition through Europe, with selection to be endorsed by ESA and Prime

- Completion of the industrial organization is done during Phase B2 (typ.1 year)

---

**Graph Details**

- 40% of non-core team volume attributed after 7 months.
- 90% of non-core team volume attributed after 12 months.

*Sub-contractor ITT Profile*
• **Consortium completion is to be achieved through an optimised number of consultations:**
  - Minimized to reduce associated workload (ITT preparation, offer preparation, tender evaluation, contract follow-up)
  - Still large enough to maintain flexibility regarding geo return constraints

• **81 consultations foreseen, with ITT combined per lots, or grouped maximizing potential synergies.**
• ITT in lots, issued by the Same Issuing Company, address in the same ITT several items which can be subcontracted to one or several companies.

• ITT in lots cover different Items belonging to the same field of activities.

• Bidders are free to answer to one or several items.
• Bidders shall provide one self standing offer per Item they answer to.

• When Bidders answer to several items, they shall identify, as an option and when relevant, synergy effect if they are selected for several items.

• At the end of Selection process, one or several contracts can be awarded with respect to the lots.
• Grouped ITT address in the same ITT several items which should be subcontracted to the same company.

• Grouped ITT cover different Items with a high level of synergy between them.

• Bidders shall answer to all the items, identifying synergy effect.
• Bidders shall provide a single offer covering all items.

• At the end of Selection process, only one contract will be awarded to cover all the items (with milestone payment plan identifying clearly MTG-I and MTG-S scopes).
The industrial geo-return is imposed by the contribution of each country in the ESA MTG development program (both Proto satellites).

The four recurrent satellites, paid by Eumetsat are not submitted to geo-return rules, but will be developed according to the prototypes organisation.
Real time information of procurement status to Industry via EMITS:

- Procurement planning,
- Intended ITTs,
- Publication of ITTs (companies need to be registered to be able to retrieve documentation)
- Answers to questions for clarification
- Extension of proposal preparation period, if any
TIME FRAMES :

- ESA main Contract is divided in 2 phases:
  - Phase B Satellite (Firm Phase) from KO (18th of November 2010) until Satellite PDR forecasted in November 2011
  - Phase CD Satellite (Conditional Phase) upon authorisation to proceed with Phase CD,

- This logic is also applicable to selected subcontractor's activities. The draft contract activities are broken down as follows:
  - Time Frame 1 (Firm Phase) from Subcontractor Kick Off until the 31st of December 2011 (1 month after Satellite PDR)
  - Time Frame 2 (Conditional Phase) upon authorisation to proceed with this Time Frame,

- Bidders financial proposals shall use this breakdown between Time Frames 1 and 2.

EEE PARTS PROCUREMENT :

- EEE Parts procurement scheme is as baseline through a CPPA procurement scheme.
  - For information, CPPA Agent should be selected in June 2011.
  - In the mean time Bidders will quote EEE parts (if any) through a self procurement scheme, stating nevertheless their compliance with CPPA procurement scheme as soon as it is implemented.
Major recommendations

- Following large competition, selection for the overall MTG contract has been based on some recognized points:
  - Optimized balance between required performance and robustness of the design
  - Comprehensive development approach ensuring the full operability of the system, and smooth continuation of the EUMETSAT meteorological services
  - Price competitive offer, taking advantage for example of series effect and synergies within and outside MTG programme

- Other specificities to be considered
  - Long-term operations, implying capability of extended in-orbit lifetime, and need for long on-ground storage for recurrent satellites

=> These elements shall be considered and properly reflected in the BP process, as part of potential supplier proposals
Detailed list of TAS-F ITTs
Issuing companies

- Thales Alenia Space – France:
  - Prime System level,
  - MTG Imager Satellite,
  - Flexible Combined Imager (FCI) instrument,
  - Infrared Sounder (IRS) Interferometer Assembly (IA) and Detection Electronic Assembly (DEA)

- OHB – Germany:
  - MTG Sounder Satellite,
  - Platform

- Kayser Threde:
  - MTG Imager FCI Telescope Assembly
  - IRS
Schedule information

• The Bidder attention is drawn to the fact that:

- the issuing ITT dates, Equipment Deliverable need dates are tentative dates which can be updated during the course of the Project.

- The ITT list reflect the best knowledge of MTG project needs. This list may be updated, depending upon the needs and the evolution of the Project.
Thales Alenia Space – France

Name: Frédéric Juchet
Purchase Contract Manager
Tel: +33 (0)4 92 28 91 76
Fax: +33 (0)4 92 92 30 10

E-mail: Frederic.juchet@thalesaleniaspace.com

Address:
100 bd du Midi – BP 99
06156 Cannes-La-Bocca Cedex
France

Thales Alenia Space – France

Name: Bernard Jacquet
Industrial Manager
Tel: +33 (0)4 92 92 31 56
Fax: +33 (0)4 92 92 30 10

E-mail: Bernard.jacquet@thalesaleniaspace.com

Address:
100 bd du Midi – BP 99
06156 Cannes-La-Bocca Cedex
France
Thales Alenia Space – France

Name: Max Bard
FCI Item Procurement Manager
Tel: +33 (0)4 92 92 76 55
Fax: +33 (0)4 92 92 30 10

E-mail: Max.bard@thalesaleniaspace.com
Address:
100 bd du Midi – BP 99
06156 Cannes-La-Bocca Cedex
France

Thales Alenia Space – France

Name: Jean Philippe Chambelland
IRS Item Procurement Manager
Tel: +33 (0)4 92 92 74 48
Fax: +33 (0)4 92 92 30 10

E-mail: Jean-philippe.chambelland@thalesaleniaspace.com
Address:
100 bd du Midi – BP 99
06156 Cannes-La-Bocca Cedex
France
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# TAS F: Combined FCI / IRS ITTs

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<th>Main element Prime</th>
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Detailed list of OHB ITTs
Thales Alenia Space – France:
- Prime System level,
- MTG Imager Satellite,
- Flexible Combined Imager (FCI) instrument,
- Infrared Sounder (IRS) Interferometer Assembly (IA) and Detection Electronic Assembly (DEA)

OHB – Germany:
- MTG Sounder Satellite,
- Platform

Kayser Threde:
- MTG Imager FCI Telescope Assembly
- IRS
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M T G

Detailed list of KT ITTs
Issuing companies

- Thales Alenia Space – France:
  - Prime System level,
  - MTG Imager Satellite,
  - Flexible Combined Imager (FCI) instrument,
  - Infrared Sounder (IRS) Interferometer Assembly (IA) and Detection Electronic Assembly (DEA)

- OHB – Germany:
  - MTG Sounder Satellite,
  - Platform

- Kayser Threde:
  - MTG Imager FCI Telescope Assembly
  - IRS
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<th>n° Main ITT</th>
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