

# FACT SHEET



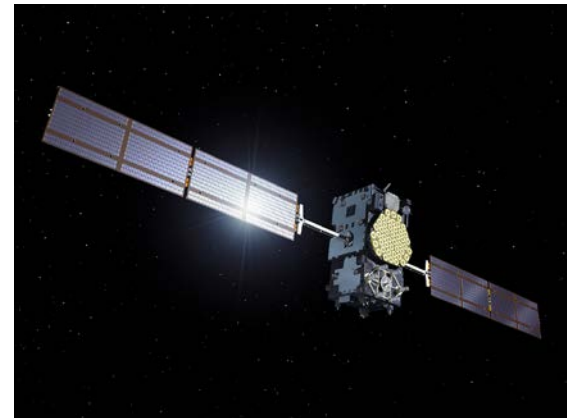
## Galileo In-Orbit Validation

Galileo is the European programme for a global satellite navigation system under civil control, consisting of 30 satellites and the associated ground infrastructure.

### IOV phase: Validating the overall concept

With 4 satellites in space, launched by pair on 21.10.2011 and 12.10.2012 from Kourou, French Guiana, this phase is aimed at qualifying the Galileo space, ground and user segments through extensive in-orbit/on-ground tests and operations of a core satellite constellation and of the associated ground segment.

The In-Orbit Validation (IOV) architecture is being implemented as an integral part of the Full Operational Capability (FOC), i.e. the complete system, consisting of 30 satellites and a set of remote stations distributed worldwide to command and monitor the constellation and deliver the navigation and timing services to the users. When validated, it will be progressively completed, in a staggered approach, to reach the FOC. As a first step, initial services will be delivered with an initial infrastructure of a constellation composed of the four IOV spacecraft and the 22 satellites ordered to date, and their associated ground segment.



## Facts and figures

### The four spacecraft

Mass	Approx. 700 kg
Size with solar array stowed	3.02 x 1.58 x 1.59 m
Size with solar array deployed	2.74 x 14.5 x 1.59 m
Design lifetime	Over 12 years
Available power	1.420 W (sunlight)/1.355 W (eclipse)
Orbit	Medium Earth Orbit
Altitude	23 222 km
Orbit inclination	56 deg.

## Payload

The payload consists of a complete navigation chain generating and broadcasting the different navigation signals of Galileo in L-band. The two rubidium atomic clocks and two hydrogen passive maser clocks are the most complex elements of the payload. Both highly stable clocks are the key to obtaining high-quality navigation signals.

## The ground segment

- Two Ground Control Centres (GCC) working in 'Split GCC' mode:
  - Fucino (Italy) GCC will host and operate the GMS (Ground Mission Segment)
  - Oberpfaffenhofen (Germany) will host and operate the GCS (Ground Control Segment)
- A network of sensor stations providing the coverage for orbitography and synchronisation measurements;
- A network of uplink stations ensuring the uplink of the navigation data;
- Two TT&C stations ensuring the control of the constellation;
- A global data dissemination network to interconnect all the ground facilities.

## Launches

The four satellites will be launched in pairs by two Soyuz launchers from the Guiana Space Centre (CSG), Kourou, French Guiana. The first pair was launched on 21 October 2011. Two more spacecraft joined them on 12 October 2012.

## IOV Contractors

Space segment:	EADS Astrium GmbH (DE) as satellite prime, with Thales Alenia Space Italy as subcontractor for satellite AIT.
Operations segment:	Spaceopal, a company created by DLR (DE) and Telespazio (IT)
System support activities:	Thales Alenia Space Italy
Ground mission segment:	Thales Alenia Space France
Ground control:	EADS Astrium (UK)
Test user segment:	Thales Avionics (FR) and Septentrio (BE)
Global data network:	British Telecom (UK)

## General information about the European Global Navigation

### Satellite Systems:

[www.satellite-navigation.eu](http://www.satellite-navigation.eu)

[www.esa.int/esaNA](http://www.esa.int/esaNA)

[www.ec.europa.eu/enterprise/policies/satnav](http://www.ec.europa.eu/enterprise/policies/satnav)

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