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## Launch of first two Galileo IOV satellites

*21 October 2011*

The successful launch of the first two Galileo In-Orbit Validation (IOV) satellites on 21 October 2011 marks the start of space segment construction for an independent European satellite navigation system. The Russian Soyuz launch vehicle with the two satellites on board lifted off from Europe's Spaceport in French Guiana at 12:30 CEST. By 2010, a total of 30 satellites are scheduled to be in Earth orbit, supplying accurate data for position determination. The Galileo Control Centre (GCC) located at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) facility in Oberpfaffenhofen, near Munich, will be responsible for controlling and monitoring the satellites. Construction and operation is being financed by the European Union.

"With Galileo, Europe is assuming an important role with its own civilian navigation system, alongside the biggest international players, and is securing future-oriented jobs," said Johann-Dietrich Wörner, Chairman of the DLR Executive Board. "The high accuracy of the Galileo signals will enable new technological applications in the area of navigation," explained Wörner.

After separating from the launcher, the satellites will orbit at an altitude of 23,222 kilometres. Each satellite has highly accurate atomic clocks on board; every signal sent to a receiver on Earth will include the time of transmission, measured with unprecedented accuracy. This information is important for calculating the location of the receiver, using the transit times of the signals and the positions of the satellites in space. The atomic clocks in the Galileo satellites are so accurate that they will drift by only one second over three million years, making the Galileo system more accurate than, for example, the existing US GPS satellite navigation system.

"Many applications will be possible for the first time using this improved accuracy," said Walter Päßgen, Managing Director of the DLR Space Applications Company (Gesellschaft für Raumfahrtanwendungen; GfR) and Head of the GCC at DLR Oberpfaffenhofen. Potential areas of application include aviation, navigation, land transportation, geodesy, agriculture and even spaceflight.

The French space agency (Centre National d'Etudes Spatiales; CNES) control centre in Toulouse will be monitoring the initial phase of the mission, the Launch and Early Orbit Phase, during the first week of the Galileo mission. The operations team at the Oberpfaffenhofen GCC will take over control and monitoring of the two satellites five days later. Each satellite, its payload and its orbit will first be carefully tested and checked. GfR, a DLR subsidiary, operates the control centre under contract to the European Union and the European Space Agency. The other control centre for the mission is located at Fucino, in Italy. Eighty engineers and technicians work at each control centre, ensuring that the first European satellite navigation mission functions flawlessly. A global network of ground stations will receive signals from the Galileo satellites and the timekeeping of the on-board clocks will be compared continuously with reference clocks on the ground.

Deployment of the satellite constellation will continue in August 2012, when another two Galileo IOV satellites will be launched. Then, with signals from four satellites available, location calculations based on Galileo data will be performed for the first time. This is the IOV phase, where the correctness of the interactions between the satellites and the ground infrastructure will be verified. The atomic clocks and navigation signal generators have already been space qualified on the GIOVE A and B test satellites. "By 2014, the constellation will have grown to 18 satellites. It is hoped that, by 2019, it will be complete and the final configuration will be in place," said Peter Hintze, Parliamentary State Secretary in the German Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi). The

European satellite system will be interoperable with the American GPS satellite navigation system – receivers will be able to use signals from both systems for position determination.

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## 21 October 2011: launch of the first two Galileo satellites



Double success: On 21 October at 12.30 CEST the first two Galileo satellites were launched on board a Russian Soyuz rocket from Europe's Spaceport in French Guiana. This was the first launch of a Soyuz rocket from French Guiana.

Credit: DLR (CC-BY 3.0).

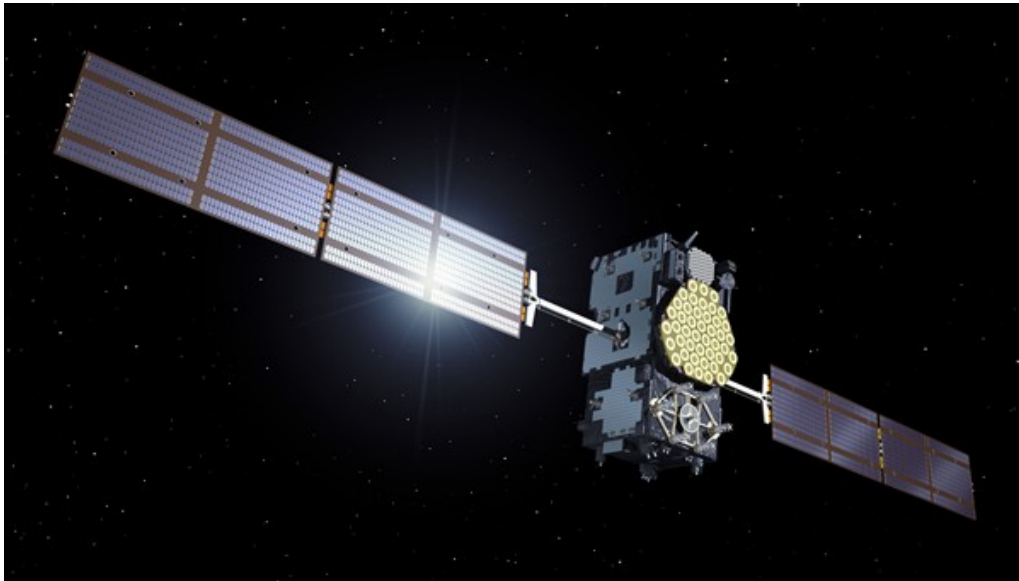
## Testing the Galileo satellite



The Galileo satellite during testing at Thales Alenia Space in Rome during May 2011.

Credit: ESA - S. Corvaja, 2011.

### **Galileo In-Orbit Validation satellite**



Artist's impression of a Galileo In-Orbit Validation (IOV) satellite.

Credit: ESA.

### **Galileo Control Centre at the DLR Oberpfaffenhofen site**



The Galileo Control Centre at the DLR site in Oberpfaffenhofen, near Munich.

Credit: DLR (CC-BY 3.0).

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