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## MUNICH SATELLITE NAVIGATION SUMMIT

# Initial Galileo Validation Satellites Delayed

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The first two European Galileo satellites intended to form part of the future 30-satellite navigation constellation will not be ready for shipment to their launch site until early 2011, with the second pair to be ready three months later, European government and industry officials said March 10.

The initial two satellites were supposed to be shipped in the second half of 2010.

The delivery delays for the four Galileo In-Orbit Validation (IOV) satellites are independent of whether their intended launch vehicle, a European version of Russia's Soyuz rocket, is operational by that time. The first two IOV satellites will be aboard the third Soyuz flight from Europe's Guiana Space Center in French Guiana. The inaugural flight, scheduled for late this summer, may slip into the fall, officials said, and could push the

third flight into mid-2011 even if the IOV satellites are ready beforehand.

The latest delay in Europe's multibillion-dollar Galileo timing and navigation satellite program will give the prime contractor for 14 follow-on satellites less than two years before it must begin launching the spacecraft in late 2012.

Speaking with a fresh sense of realism after numerous Galileo deadlines have been missed, officials attending the Munich Satellite Navigation Summit here said that while Galileo may be able to provide an initial set of services in 2014, the system is unlikely to be fully operational before 2016 to 2019.

Paul Verhoef, satellite navigation program manager at the European Commission, which is financing Galileo, said the full-service start date depends on when the program is given the additional money needed to build the full 30-satellite constellation.

OHB Technology of Bremen,

Germany, is under contract to build 14 Galileo satellites, with the first two to be delivered in time for launch in late 2012. Ingo Engelin, OHB's Galileo program director, said the company is confident it can make this date, although he conceded it will be a challenge.

Once the first two satellites are completed, OHB and its partner, Surrey Satellite Technology Ltd. of Britain, will be turning out Galileo satellites at a rate of about one every six weeks, in time to launch all 14 by late 2014. Engelin said his experience managing production of the five German SAR-Lupe radar reconnaissance satellites gives him confidence that once the first two satellites are completed, the remaining 12 will be delivered rapidly.

Astrium Satellites and Thales Alenia Space are leading a consortium building the four IOV satellites. Mike Healy, director of navigation at Astrium Satellites, said all four are in the assembly, integration and test phase at a Thales Ale-

nia Space plant near Rome.

Healy confirmed European government officials' assessment that the first two IOV spacecraft likely will not be ready for shipment to the launch site until the first quarter of 2011. The second pair should be ready for launch in the second quarter, Healy said.

Galileo program officials are concerned that cash-strapped European Union governments will attempt to limit the constellation to 18 satellites, which is enough to provide limited initial service.

Javier Benedicto, head of the Galileo project office at the European Space Agency, which is serving as technology manager for Galileo on behalf of the European Commission, said Galileo's mass-market Open Service, its search-and-rescue function and its government-only, encrypted Public Regulated Service could function with only 16 satellites.

Because of higher-than-expected costs for the IOV development phase and for the launch vehicles

for the 14 operational satellites, the European Commission does not have sufficient funds to build and launch the intended constellation of 30 spacecraft — 27 operational satellites and three in-orbit spares, Verhoef said.

Verhoef reacted strongly to the idea that 18 satellites is enough.

"We need 27 operational satellites in the air," Verhoef said here March 9. "It is an illusion to believe we can do this with 18 satellites. To give you an idea, that would mean that for three weeks in the year you will not have satellite navigation. One-half of a BMW is not a car."

Johann-Dietrich Woerner, chairman of the German space agency, DLR, agreed that the Galileo constellation would lose much of its future potential if it were slashed to fewer than 27 satellites. "We need all 30 satellites including the spares," Woerner said.

Verhoef did not speculate on whether financing for the remaining satellites and their launchers would be available before 2014, when the European Commission's next budget cycle begins.

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