

# ARCHIVED REPORT

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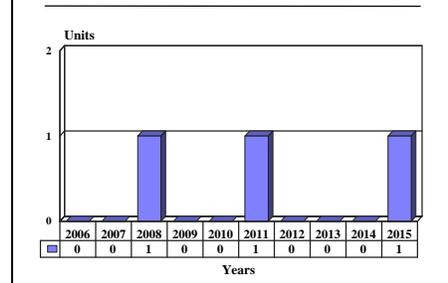
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## Gemini - Archived 3/2007

### Outlook

- Gemini platforms are available 24 months from contract signing
- Galileo Testbed (GIOVE A, former GSTB-V2A) is the first spacecraft to use the Gemini platform
- Further Gemini opportunities possible in Galileo satellite navigation system but most likely in European Space Agency

10 Year Unit Production Forecast  
2006 - 2015



### Orientation

**Description.** Gemini (GEostationary MINIsatellite) is a 400-kilogram-class geostationary communications minisatellite platform.

**Sponsor.** The Gemini demonstration mission is being funded by Surrey Satellite Technology Ltd (SSTL), the British National Space Centre (BNSC), the Nigerian Federal Ministry of Science and Technology, and a consortium of private investors from Nigeria.

**Status.** The Gemini platform is in production.

**Total Produced.** One. Gemini can be ready to launch 24 months from contract signing.

**Application.** Gemini is designed to provide television, digital radio, Internet, phone, and voicemail services.

**Price Range.** The estimated cost of a Gemini mission, including launch, is \$38 million.

### Contractors

Surrey Satellite Technology Ltd, SSTL, <http://www.sstl.co.uk/>, Surrey Space Centre, University of Surrey, Guildford, GU2 5XH United Kingdom, Tel: + 44 0 1483 689278, Fax: + 44 0 1483 689503, Email: [info@sstl.co.uk](mailto:info@sstl.co.uk), Prime

**NOTE(S):** The Gemini platform and components are constructed exclusively by SSTL at its facility in Surrey, U.K.

### Technical Data

The Gemini (Geostationary Minisatellite) Direct Platform offers low-cost geostationary communications from a small satellite. The platform accommodates payloads up to 110 kilograms mass and 800 W power to provide a variety of communications services. It features autonomous orbit control and deployable arrays to provide high specific payload power and autonomous operations.

The cubic platform comprises two separate stacked thrust tubes. The two deployable solar arrays are stowed before launch. A hydrazine monopropellant propulsion system provides the orbital slot acquisition, followed by stationkeeping over the satellite's seven-year design life, and end-of-life maneuvering into a graveyard orbit. Gemini also features in-orbit reprogrammable software and dual redundancy and functionally redundant systems. Control Area Networks are employed in a distributed telemetry and

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telecommand network. The onboard ADCS can support the accurate antenna pointing requirements.

Gemini is reportedly compatible for launch on a wide array of rockets, although a ride as a secondary payload on a Proton appears optimal. Surrey Satellite can tailor

its Gemini spacecraft to meet user requirements, and offers mission design, spacecraft, and a fully compatible ground station and mission control center, as well as training for any Gemini mission.

	<u>Metric</u>	<u>U.S.</u>
<b>Dimensions</b>		
Spacecraft (stowed)	1 x 1 x 1 m	3.28 x 3.28 x 3.28 ft
Antenna (deployed)	1 m (parabolic dish)	3.28 ft
<b>Weights</b>		
Spacecraft Mass	<400 kg	<882 lb
<b>Performance</b>		
Design Life	7 years nominal	
Uplink/Downlink Communications	S-band	
Transponders	Up to 8 Ku-band	
Solar Panels (deployable)	9 high-performance panels	
Power	Up to 800 Watts	
Attitude	3-axis stabilized	
Batteries	Li-Ion	

## Variants/Upgrades

**GSTB-V2A.** SSTL has based the GSTB-V2A on its Gemini platform. This bus will carry the GSTB-V2A payload elements. In November 2005, this spacecraft was renamed GIOVE A.

## Program Review

**Background.** In August 2000, the BNSC awarded Surrey Satellite Technology Ltd GBP5 million (approximately \$7.5 million) to fund the Gemini portion of the MOSAIC (Micro Satellite Applications In Collaboration) program. MOSAIC co-funds initial demonstration missions in partnership with companies in the U.K.

Three months later, SSTL was contracted by the Nigerian government to provide a feasibility study for the NigeriaSat-2 communications satellite based on the Gemini platform. At that time, Nigeria had also signed a \$12 million contract with SSTL for a remote sensing satellite and training program unrelated to Gemini.

**Galileo Testbed Satellite.** SSTL was contracted to provide a testbed satellite (GSTB-V2A) for the European Galileo satellite navigation system. The contract was signed in July 2003 and is worth \$31.5 million. SSTL has based the GSTB-V2A on its Gemini platform. This bus will carry the GSTB-V2A payload elements, the most important of which is a navigation

signal generator capable of transmitting the codes and frequencies that will be used for the Galileo operational system.

Transmissions from GSTB-V2A will be used to analyze signal structures, band sharing scenarios, and receiver technologies for Galileo. An environmental monitoring segment will measure the radiation and spacecraft environments in MEO, and a host of technology demonstration elements will round out the payload. SSTL started the GSTB-V2A program in July 2003, and the satellite must be launched in time to meet a frequency requirements deadline in June 2006 that was established by the International Telecommunications Union.

### Recent Activity

**Galileo Satellite Renamed.** In November 2005, ESA renamed the SSTL built GSTB-V2A spacecraft, "GIOVE A". The spacecraft was moved for launch to the Baikonur Cosmodrome in late 2005 to meet the June 2006 ITU deadline.

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## Timetable

<u>Year</u>	<u>Major Development</u>
2000	BNSC awards funding to Gemini program
2005	GSTB-V2A launch planned

## Forecast Rationale

In 2005, Forecast International reported that the Nigeriasat-2 negotiations between Nigeria and SSTL were proceeding well and a successful outcome, read: contract, was expected. In a surprise move, however, the Nigeriasat-2 contract went to a Chinese company in late 2005. The China Aerospace Science & Technology Corporation (CASC) will build Nigeriasat-2 (Nigcomsat-1) using the company's Dong Fang Hong-4 (see separate DFH report in this tab) satellite bus. Since the Gemini platform is no longer an option for the Nigeriasat-2 satellite, one must now consider what possible contracts might be realistically entertained for the SSTL bus.

To date, there are no other orders pending for the Gemini platform, but this may change especially if the European Space Agency decides to use the platform for the "Cosmic Vision 2020" plan, which encourages the use of common, inexpensive, and reusable spacecraft as an efficient cost-saving measure. This is a great potential opportunity for SSTL whose main competition

will come from the likes of the Swedish Space Corporation and its SMART spacecraft and Verhaert Design & Development, which offers the PROBA platform (see separate reports in Tab E).

The Gemini platform is a great opportunity outside of Europe as well, especially for developing countries and nations with restrictive space budgets. Surrey Satellite has proven its place in the smallsat arena and its interest in advancing space capabilities worldwide. This, combined with the expected trend toward cost-effective, highly modular small spacecraft, especially at the European Space Agency, could generate sufficient interest in the Gemini platform.

There is a possibility that the Gemini platform could also be chosen for the Galileo Satellite Navigation program, but this contract seems likely headed for one of the bigger European spacecraft manufacturers such as EADS Astrium or Alcatel Alenia Space. For now, our Gemini forecast stands at production of three platforms, most likely for use in ESA programs.

## Ten-Year Outlook

### ESTIMATED CALENDAR YEAR PRODUCTION

<u>Space System</u>	<u>thru 05</u>	<u>High Confidence Level</u>			<u>Good Confidence Level</u>			<u>Speculative</u>			<u>Total 06-15</u>	
		<u>06</u>	<u>07</u>	<u>08</u>	<u>09</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>		<u>15</u>
SURREY SATELLITE TECH LTD												
GEMINI	0	0	0	1	0	0	1	0	0	0	1	3
GEMINI (GIOVE A)	1	0	0	0	0	0	0	0	0	0	0	0
Total Production	1	0	0	1	0	0	1	0	0	0	1	3