

# Surrey Platforms: GEMINI Direct



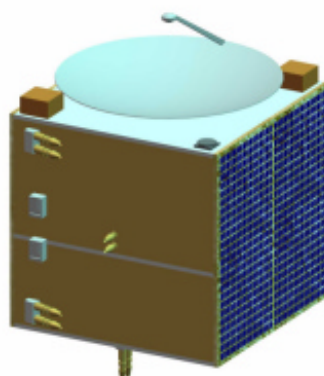
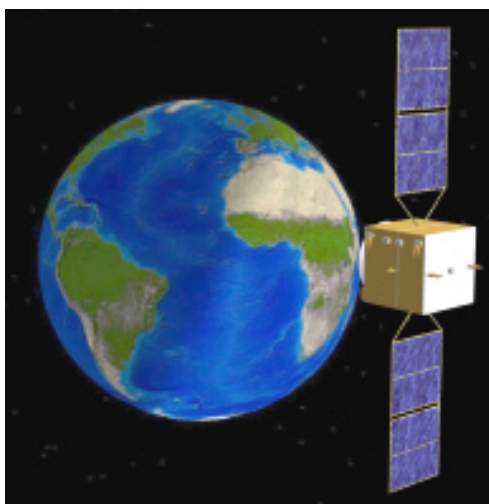
The SSTL GEMINI (Geostationary Minisatellite) Direct Platform offers low cost, Geostationary communications from a small satellite. The platform can accommodate payloads up to 110 kg mass and 800 W power, enabling provision of a diverse array of communications services. Key features are autonomous orbit control, deployable arrays to provide high specific payload power and autonomous operations - these enable an excellent quality of service over the mission lifetime.

## Mission

The GEMINI Direct Platform can accommodate communications transponders to provide user-specified regional coverage, supporting a variety of broadcast voice, TV and Internet services. As an example of available performance - the platform will support up to eight Ku-band transponders, offering reliable communications services for business, government, entertainment and public use.

## Spacecraft

The platform structure is cubic and comprises two separate stacked thrust tubes. Pre-launch, the deployable solar arrays are stowed against the platform body inside the launch volume of 1.1m<sup>3</sup>. A hydrazine monopropellant propulsion system provides the orbital slot acquisition following the direct geostationary orbit injection and it also provides for station keeping over a 7 year design lifetime. On-board computers and in-orbit re-programmable operating system software provide a high level of autonomous operation and flexibility. Control Area Networks are employed in a distributed telemetry and telecommand network. The on-board ADCS can support the accurate antenna pointing requirements. TT&C can be performed either via the payload or via the S-band communications link. An excellent power margin is achievable up until end-of-life (EOL) using the deployable, sun-tracking panels. The platform is designed to withstand the harsh radiation environment at geostationary altitude for a minimum of 7 years. At EOL the propulsion system will provide safe satellite disposal from GEO, manoeuvring into a graveyard orbit.



## GEMINI Direct Features

- **Rapid Development** - ready-to-launch 24 months from contract signing
- **Low Cost** - SSTL commercial approach & pioneering experience in small satellites
- **Mission & Payload Flexibility** - can be tailored to meet user-requirements
- **Launcher Compatibility** enables launch on a wide variety of launch vehicles
- **Heritage** - SSTL's first minisatellite platform was launched early 1999 and has been operating successfully since. Based on SSTL's management & engineering design approach, the platform benefits from over 100 years of in-orbit experience
- **Turn Key System** - SSTL can offer mission design, spacecraft and fully compatible ground station and mission control centre, as well as training

## Mission & Spacecraft

- Shared Proton launch direct to GEO
- 400 kg class satellite
- Up to 110 kg payload mass
- Up to 800 W payload power
- Payload TTC (prime)
- S-band TTC (back-up)
- Autonomous orbit control
- 3-axis, momentum biased high performance ADCS
- Autonomous operations
- Reprogrammable on-board software
- 2 deployable solar arrays
- Active thermal control

## Heritage/Experience

- Over 100 years in-orbit experience
- Verifies SSTL's low cost management & engineering approach
- 16 microsatellites to date
- 400 kg advanced minisatellite
- 7 kg advanced nanosatellite

## SSTL Beyond LEO

- Flight hardware on STRV-1a,b,c,d GTO missions
- GEODEM mission study (ESA)
- LunarSat mission study (ESA)
- MMS mission study (NASA)
- Momentum wheel for the Rosetta comet mission (ESA)

## Issue Number & Notice

SSTL-2004-02. 06-08-2001. This platform data sheet is not contractual and can be changed without any notice. Please contact SSTL for further information.

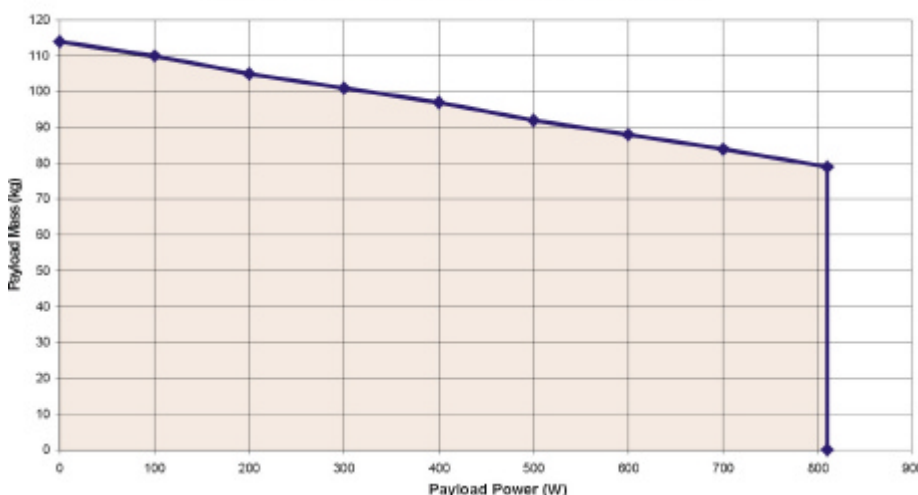
# Surrey Platforms: GEMINI Direct



## GEMINI Direct: Mission & Platform Specifications

Mission	Contract-to-Launch Launch Launch Vehicle Lifetime EOL Disposal	24 months Direct injection into Geostationary parking orbit Proton, secondary passenger 5 years nominal; 7 years design life Geostationary + 250 km graveyard orbit
Payload Accommodation	Mass Power Payload	Up to 110 kg (see below) Up to 800 W (see below) Dependent on customer requirements
Physical	Dimensions and mass	Less than 1.1 x 1.1 x 1.1 m (stowed) and less than 400 kg
Power	Solar Panels	2 deployable sun tracking arrays
	Batteries	Li-Ion
Thermal	Thermal	Active control
ADCS	Sensors	Earth sensors, sun sensors and inertial measurement unit
	Actuators	Reaction wheels, thrusters
Orbit Determination	Attitude	3-axis stabilised, pitch momentum bias
Orbit Control	Method	GPS and PRN ranging
	Method	Autonomous North-South and East-West Station Keeping
	Propulsion	Hydrazine, catalytic decomposition, 0.5 N thrusters
Command & Data	Processor	2 cold redundant, radiation tolerant OBCs
Handling	TC & TM	Triple redundant CAN (ISO-11898);
	Operating System	In-house design operating system. In-orbit reprogrammable
Communications	TTC Uplink	Prime – Hot redundant payload receiver Back-up - Hot redundant S-band receiver
	TTC Downlink	Prime – Cold redundant payload transmitter Back-up - Cold redundant S-band transmitter
Redundancy	Spacecraft	Dual & functionally redundant systems
Cost	GEMINI Direct	For a quotation, please contact SSTL with your requirements.

Platform payload carrying capability



## Contact



**Surrey Space Centre**  
University of Surrey  
Guildford, Surrey GU2 7XH  
United Kingdom

Tel: +44 (0)1483 879278  
Fax: +44 (0)1483 879503  
E-mail: [info@sstl.co.uk](mailto:info@sstl.co.uk)  
www: [www.sstl.co.uk](http://www.sstl.co.uk)

## Other Products and Services

- With over 100 years of in-orbit experience, SSTL is currently designing and building constellations employing our low cost nano-, micro-, and mini- satellite platforms
- SSTL also provides: Mission & Constellation Design; Systems Engineering; Ground & Launch Support; In-Orbit Commissioning & Operations
- **Please contact SSTL for further details and a quotation on any product**

affordable access to space