

# GEOStar™ -2 Bus

## Specifications

### Core Bus Features

|                           |   |
|---------------------------|---|
| Bus Dry Mass:             | 800-1,500 kg  |
| Max. Launch Mass:         | 3,325 kg  |
| Payload Mass Capability:  | 500 kg  |
| Orbit:                    | Geosynchronous  |
| Typical Mission Lifetime: | >15 years   |
| Delivery:                 | 24 months (typical) after receipt of order                    |
| Launch Vehicle            |   |
| Compatibility:            | Ariane, Soyuz, Land Launch, Proton, H2A, Falcon-9, Sea Launch |

### Structure

|                         |                        |
|-------------------------|------------------------|
| Bus Dimensions (HxWxL): | 1.75 m x 1.7 m x 1.8 m |
| Construction:           | Composite/Al           |

### Power Subsystem

|                |  |
|----------------|--|
| Payload Power: | Up to 5,550 W orbit average @ 15 years |
| Bus Voltage:   | 24-36 VDC (nominal)                    |
| Solar Arrays:  | Multi-junction GaAs cells              |
| Batteries:     | Li-Ion                                 |

### Attitude Control Subsystem

|                        |                            |
|------------------------|----------------------------|
| Stability Mode:        | 3-axis; zero momentum      |
| Propulsion Subsystem   |                            |
| Transfer Orbit System: | Liquid bi-propellant       |
| On Orbit:              | Monopropellant (hydrazine) |

### Command & Data Handling Subsystem

|                         |                      |
|-------------------------|----------------------|
| Flight Processor:       | MIL-STD-1750A        |
| Interface Architecture: | MIL-STD 1553B, CCSDS |

## More Information

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## Shared Launch Opportunities

Due to the size and mass envelope of the satellite, the GEOStar-2 Bus is compatible with almost all commercially available launch vehicles, maximizing opportunity for launch and access to space. While dedicated or single launch services are more readily available, the GEOStar-2 Bus targets shared launch opportunities, where launch cost and launch-sharing opportunities are favorable.

## Mission Services

Customers can purchase the GEOStar-2 Bus spacecraft bus alone, or as part of a turn-key service that includes an integrated payload, network operations center and launch vehicle. Orbital ATK conducts spacecraft commissioning from its own ground station prior to transferring spacecraft control to the customer's operations center.

## Mission Life

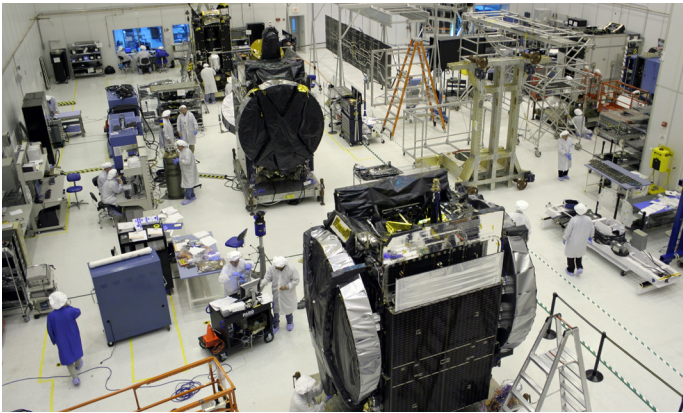
The satellite is designed with conservative margin beyond 15 years, taking into account for the severe geosynchronous radiation environment. The typical limitation of mission duration is on-board fuel for orbit maintenance station-keep. However, fuel life can be optimized and extended to more than 15 years, based on launch vehicle selection.

## Heritage

The GEOStar-2 Bus fills a market niche for small, high power geosynchronous communications spacecraft. Orbital ATK's first application of the GEOStar-2 Bus design, N-STAR c, was successfully launched in July 2002 on an Ariane rocket. Since then, Orbital ATK has launched 27 GEOStar-2 Bus spacecraft with three in production.

## Versatility

Several available options augment the basic bus to provide improved pointing, more payload power, secure communications, higher downlink data rates or enhanced payload computing power.



Orbital ATK's Dulles, Virginia satellite manufacturing facility



# GEOStar™ -2 Bus

A Fully Redundant, Flight-Proven, Spacecraft Bus Designed for Geosynchronous Missions

## FACT SHEET



## Advantages of the GEOStar-2 Bus

Orbital ATK's GEOStar-2 Bus design is unique within the satellite industry. Orbital ATK's GEOStar-2 Bus provides an affordable low-to-medium power satellite platform that is ideal for missions of this size. Rather than being a less efficient version of a larger, heavier product, Orbital ATK's GEOStar-2 Bus is designed specifically for the 1,000 to 5,550 watts payload class. The GEOStar-2 Bus is flight-proven with excellent operational performance among the 29 currently in-orbit. With two more GEOStar-2 satellites now in production or awaiting launch, Orbital ATK has established its class of GEO satellite products as the unquestioned market leader.

## Design

The GEOStar-2 Bus satellite is a modular, mass efficient structure, designed for simplified integration to reduce manufacturing cycle times. The structure is supported by a composite thrust cylinder, to which the bus, payload, nadir and base panels are connected. Energy from two multi-panel solar wings and lithium ion batteries is electronically processed to provide 36 volts regulated power to the satellite throughout the mission. All active units aboard the satellite are connected through a 1553 data bus. Commands and telemetry are processed through the flight software resident on the flight processor, which provides robust autonomous control to all GEOStar-2 satellites. The modularity of the structure and the standard 1553 interfaces allow parallel assembly and test of the bus and payload systems, reducing manufacturing schedule risk by minimizing the time spent in serial satellite integration and test flow.

## Payload Support

While primary applications are Fixed Satellite Services (FSS) and Broadcast Satellite Services (BSS), the GEOStar-2 Bus can be adapted for MSS, Earth and space science applications, as well as for technology demonstration or risk reduction programs. Depending on mission duration requirements, the GEOStar-2 Bus can accommodate payloads in excess of 500 kilograms, and provide up to 5,550 watts of power. Instrument data can be provided in standard format such as CCSDS or through secured encryption, as approved by the National Security Agency (NSA).

## FACTS AT A GLANCE

- Orbital ATK is the world's leading provider of small- to medium-class geosynchronous Earth orbit (GEO) communications satellites.
- 36 GEO communications satellites delivered since 1997.
- Average delivery of 24 months.
- GEOStar-2 leads the industry with in-orbit reliability.

GEOSTAR BUS HERITAGE

|   |  |
|---|--|
| <b>SKYM-1</b><br>Mission: Ku- and R-band<br>Launch: 2015  | <b>MEASAT-3a</b><br>Mission: Ku-band DTH, C-band FSS<br>Launch: 6/21/09  |
| <b>Amazonas 4A</b><br>Mission: Ku-band<br>Launch: 3/22/14   | <b>AMC-21</b><br>Mission: Ku-band FSS<br>Launch: 8/14/08   |
| <b>Thaicom-6</b><br>Mission: Ku- and C-band<br>Launch: 1/6/14   | <b>THOR 5</b><br>Mission: Ku-band FSS and BSS<br>Launch: 2/11/08   |
| <b>SES-8</b><br>Mission: Ku- and Ka-band<br>Launch: 12/3/13   | <b>Horizons-2</b><br>Mission: Ku-band FSS<br>Launch: 12/21/07  |
| <b>Azerspace/Africasat-1a</b><br>Mission: C- and Ku-band FSS<br>Launch: 2/7/13  | <b>Intelsat 16</b><br>Mission: Ku-band DTH<br>Launch: 2/11/10  |
| <b>Mexsat Bicentenario</b><br>Mission: C- and Ku-band FSS<br>Launch: 12/19/12   | <b>Intelsat 15</b><br>Mission: Ku-band FSS and BSS<br>Launch: 11/30/09   |
| <b>Star One C3</b><br>Mission: C- and Ku-band FSS<br>Launch: 11/10/12   | <b>Intelsat 11</b><br>Mission: Ku-band DTH, C-band FSS<br>Launch: 10/5/07  |
| <b>Intelsat 23</b><br>Mission: Ku- and C-band<br>Launch: 10/14/12   | <b>Optus D-Series</b><br>Mission: Ku-band DTH and FSS<br>Launch: D1: 10/13/06; D2: 10/5/07; D3: 8/21/09  |
| <b>HYLAS 2</b><br>Mission: Two-way Ka-band Communications<br>Launch: 8/2/12   | <b>TELKOM-2</b><br>Mission: C-band FSS<br>Launch: 11/16/05   |
| <b>Intelsat 18</b><br>Mission: Ku- and C-band<br>Launch: 10/5/11  | <b>Galaxy 12, 14 and 15</b><br>Mission: C-band FSS (G-15: C-band FSS and L-band Navigation)<br>Launch: G-12: 4/9/03; G-14: 8/14/05; G-15: 10/13/05 |
| <b>Intelsat 28</b><br>Mission: Ku- and C-band FSS<br>Launch: 4/22/11  | <b>N-STAR c</b><br>Mission: S-band MSS<br>Launch: 7/5/02   |
| <b>KOREASAT 6</b><br>Mission: Ku-band DBS and FSS<br>Launch: 12/29/10   |  |
| <b>SES-1, SES-2 and SES-3</b><br>Mission: Ku-band BSS, C-band FSS and Ka-band<br>Launch: SES-1: 4/24/10; SES-2: 2011; SES-3: 2011 |  |
| <b>NSS-9</b><br>Mission: C-band FSS<br>Launch: 2/12/09  |  |

