LEOStar-3 Bus

Spacecraft Features

Spacecraft Mass:	From 300 to over 4,000 kg (incl. payload)
Redundancy:	Single string, selective redundancy or fully redundant
Orbit Options:	Low Earth Orbit, typically 450-1,000 km altitude, any inclination. MEO, HEO, Lunar, or Lagrange Point missions
Design Life:	1 to 10 years
Delivery:	Ready for payload integration in 30 to 36 months
Launch Vehicle Compatibility:	Pegasus, Minotaur, Antares, Delta, Atlas, Falcon 9

Payload Accommodation

Payload Mass:	150 to over 3000 kg
Payload Power:	150 to 800 Watts OAP Higher power payloads can be accommodated due to the scalability of the spacecraft power system design
Stability Mode:	3-axis Zero Momentum Bias (ZMB). Pitch momentum bias and spin stabilized configurations also available
Pointing:	Knowledge: 10 arcsec Control: 15 arcsec Stability: < 1 arcsec/sec Sub arc-sec pointing knowledge achievable and demonstrated on orbit with enhanced performance Star Trackers
Propulsive Capability:	Mono-propellant blow-down system with ~170 m/sec Delta-V for a 4300 kg satellite carrying ~ 350 kg propellant. Both higher and lower propellant/Delta-V capabilities available
Data Storage:	Scalable to > 3 Tbit in dedicated data recorder
Payload Interfaces:	RS/422, RS-485, LVDS, MIL-STD-1553 and SpaceWire (optional)
Data Downlink:	2 to 4 Mbps S-band. Up to 740 Mbps X-Band (optional) or 622 Mbps Ka-band (optional)
Command Uplink:	2 Kbps S-Band Up to 1024 Kbps (optional)

GEOEye-1 Commercial Earth Imaging Satellite

NASA's Fermi Gamma Ray Telescope Observatory

Key Contacts

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Orbital ATK

LEOStar™-3 Bus

A Medium-to-Large, High Performance, Versatile and Expandable Spacecraft Bus Designed for 1 - 10 Years Low Earth Orbit Missions. Suitable for Space and Earth Scientific, Remote Sensing and Other Applications.

FACT SHEET

Design

Our LEOStar-3 spacecraft is a high performance, versatile and expandable vehicle for space and Earth scientific, remote sensing, and commercial applications. LEOStar-3 spacecraft have flown on Pegasus®, Minotaur, Delta II and Atlas V launch vehicles, and are compatible with other launch vehicles such as Falcon 9 and Antares™. The platform is optimized for Low Earth Orbit missions and is readily adaptable to other missions (MEO, Lunar or Lagrange Points).

The avionics architecture uses an open frame avionics structure with a cPCI backplane. Extensive Field Programmable Gate Arrays (FPGAs) use provides re-programmability and reduces EEE parts count. The avionics are available in single-string, selectively redundant or fully redundant configurations using EEE-INST-002 level 2 or level 3 parts.

Payload Accomodations

LEOStar-3 configurations accommodate payload masses from 150 kg to over 3,000 kg and a Payload Orbit Average Power (OAP) of 150 to 800 Watts. Standard ACS configurations have yielded 10 arcsec knowledge and 15 arcsec control. We have provided sub arc-sec pointing knowledge on orbit with enhanced performance Star Trackers. Payload data accommodation is scalable to > 3 Tbit in dedicated data recorder. Downlink of payload data is accommodated with high rate X or Ka-band RF subsystems up to 740 Mbps.

FACTS AT A GLANCE

- A highly scalable spacecraft compatible with a wide variety of launch vehicles.
- Available in single string, selectively redundant and fully redundant configurations.
- 13 missions launched to date, two in production.
- Payload Support:
  - 150 to 3000 kg.
  - 150 to 800 Watts OAP.
  - 10 arcsec pointing knowledge and 15 arcsec pointing accuracy.
  - Sub arcsec knowledge achievable, and demonstrated on orbit, with enhanced attitude control sensors.
  - Data storage scalable to > 3 Tbit.

LEOStar-3 Bus

Mission Services

We can deliver LEOStar-3 spacecraft alone or as part of a “turn-key” service including mission design, instrument/payload integration, instrument provision, satellite environmental test, launch services, early orbit checkout, and mission operations, including delivery of instrument data. We have the end-to-end capability to build, integrate, test, launch and operate missions.

Production Approach

Using mature designs, proven assembly and test procedures, and established vendor sources, we can deliver a LEOStar-3 spacecraft ready for instrument integration in 30 to 36 months after receipt of order.

Heritage

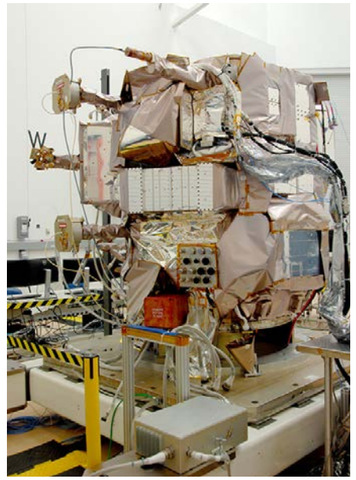
Currently, Orbital ATK has six LEOStar-3 based satellites on-orbit and has three in production. First developed for the Air Force’s Miniature Sensor Technology Integration (MSTI) series satellites, LEOStar-3 spacecraft have flown in single string, selectively redundant, and fully redundant configurations. ICESat-2 and JPSS-2, the most recent LEOStar-3 spacecraft, are currently in development at our Gilbert, Arizona satellite manufacturing facility.

Options

LEOStar-3 is Orbital ATK’s most versatile spacecraft. The LEOStar-3 spacecraft architecture is highly scalable and modular design and has been configured to suit a wide variety of mission and payload requirements and launch vehicles – Low and high power, single string to fully redundant. LEOStar-3 has flown a variety of attitude control actuators and sensors with a wide range of performance characteristics. In addition, we have met customer data requirements with many combinations of data storage and downlink equipment.

Additional Features

We have demonstrated performance in developing and manufacturing affordable mission solutions dependably and deliver highly capable flight systems under tight cost and schedule constraints.



NASA’s ICESat-2 (Ice, Cloud, and Land Elevation Satellite-2)

The NASA/USGS Landsat 8 Observatory

LEOStar-3 Programs*

Landsat 9

Mission: Earth resources monitoring
Launch: December 2020
Status: In development

JPSS-2 - Joint Polar Satellite System-2

Mission: Earth science
Launch: October 2020; ATLAS-V, Falcon 9 or Delta IV
Status: In development

ICESat-2 - Ice, Cloud and Land Elevation Satellite-2

Mission: Earth science
Launch: 2017; Delta II
Status: In development

Landsat 8

Mission: Earth resources monitoring
Launch: February 11, 2013; Atlas V
Status: Operational, currently performing baseline mission

GeoEye-1

Mission: Commercial Earth imaging
Launch: September 6, 2008; Delta II
Status: Baseline mission complete, currently in extended operations

Fermi Gamma-ray Space Telescope

Mission: Gamma-ray observation
Launch: June 11, 2008; Delta II
Status: Baseline mission complete, currently in extended operations

C/NOFS – Communication/Navigation Outage Forecasting System

Mission: Technical demonstration
Launch: April 16, 2008; Pegasus XL
Status: Retired and re-entered 11/25/15

NFIRE – Near Field Infrared Experiment

Mission: Technical demonstration
Launch: April 24, 2007; Minotaur I
Status: Retired and Re-entered 11/4/15

Swift

Mission: Gamma-ray burst detection
Launch: November 20, 2004; Delta II
Status: Baseline mission complete, currently in extended operations

Coriolis

Mission: Meteorological science
Launch: January 6, 2003; Titan II
Status: Baseline mission complete, currently in extended operations

RHESSI – Reuven Ramaty High Energy Solar Spectroscopic Imager

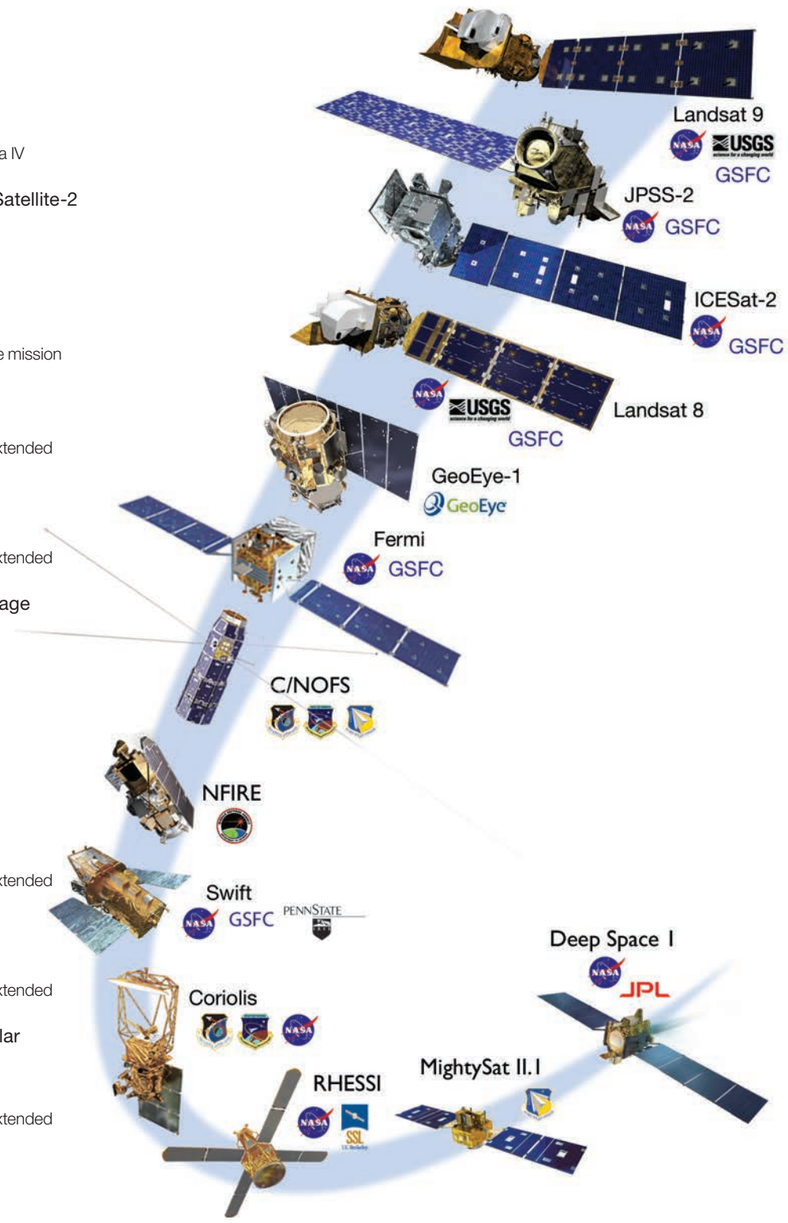
Mission: High energy solar physics
Launch: February 2, 2002; Pegasus XL
Status: Baseline mission complete, currently in extended operations

MightySat II.1

Mission: Technology demonstration
Launch: July 19, 2000; Minotaur I
Status: Mission completed

DS1 – New Millenium Deep Space 1

Mission: Technology demonstration and planetary exploration
Launch: October 24, 1998; Delta II
Status: Mission completed



* Unclassified missions only