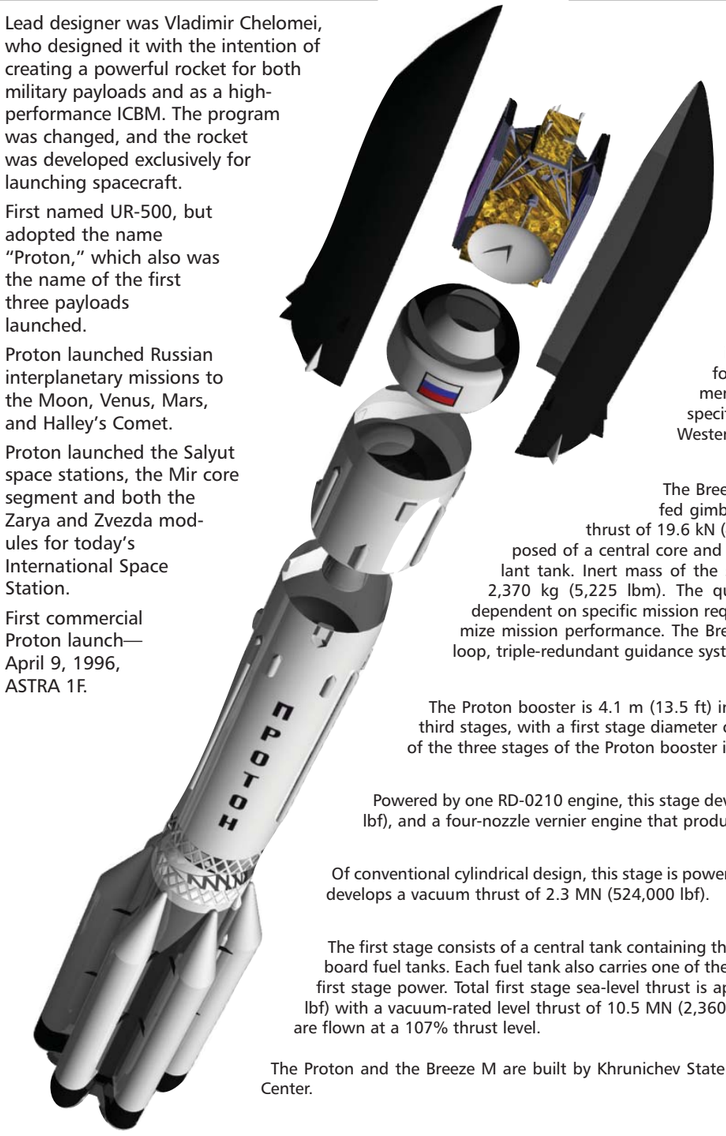
THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating a powerful rocket for both military payloads and as a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya and Zvezda modules for today's International Space Station.
- First commercial Proton launch—April 9, 1996, ASTRA 1F.



Proton Description

Total Height
56.2 m (184 ft)

Gross Liftoff Weight
691,272 kg
(1,523,565 lbm)

Propellant
UDMH and N_2O_4

Initial Launch
July 16, 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our Western customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 19.6 kN (4,400 lbf). The Breeze M is composed of a central core and a jettisonable additional propellant tank. Inert mass of the stage at liftoff is approximately 2,370 kg (5,225 lbm). The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance. The Breeze M is controlled by a closed loop, triple-redundant guidance system.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0210 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (6,900 lbf).

Second Stage
Of conventional cylindrical design, this stage is powered by four RD-0210 engines and develops a vacuum thrust of 2.3 MN (524,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-275 engines that provide first stage power. Total first stage sea-level thrust is approximately 9.5 MN (2,140,000 lbf) with a vacuum-rated level thrust of 10.5 MN (2,360,000 lbf). The first stage engines are flown at a 107% thrust level.

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
SES SIRIUS AB
www.ses-sirius.com

Satellite Manufacturer
Lockheed Martin Commercial Space Systems
www.lmcommercialspace.com

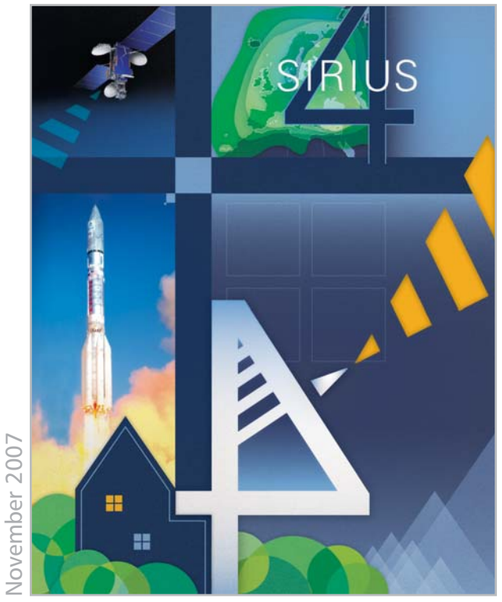
Platform
A2100 AX

Separated Mass
4385 kg

Design Life
15 years

Mission
SIRIUS 4 is a multi-mission Ku/Ka-band satellite consisting of 54 active transponders that will provide a wide range of telecommunications services. Of the 52 Ku-band transponders, 46 will cover Europe and six will cover Africa. One Ka-band transponder will serve the Baltic/Nordic region and another Africa.

www.ilslaunch.com



November 2007

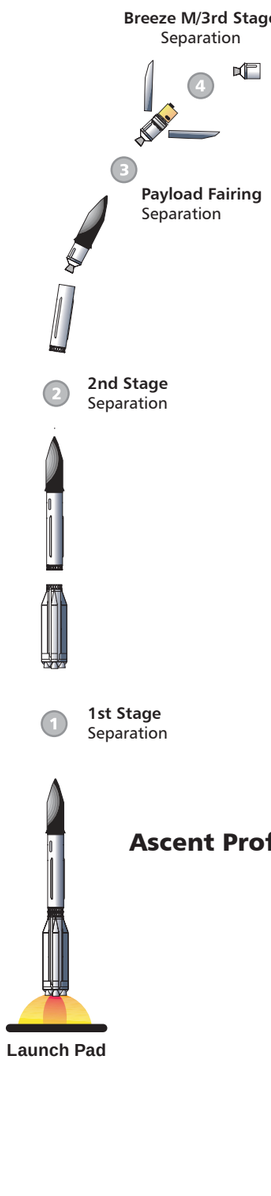
SIRIUS 4

Mission Overview

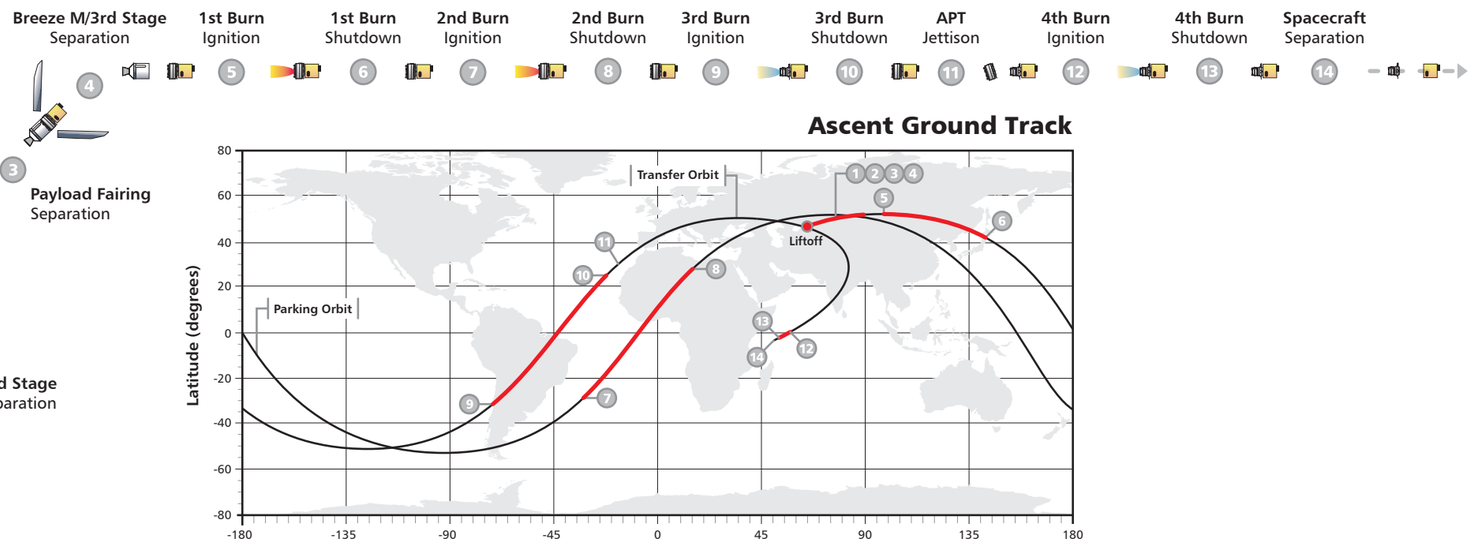
- 4th ILS Proton launch in 2007
- 329th Proton launch
- 10th launch of A2100 model

THE **MISSION**

The Proton Breeze M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 39 at the Baikonur Cosmodrome, Kazakhstan, with the **SIRIUS 4** satellite on board. The first three stages of the Proton will use a standard ascent trajectory to place the Breeze M fourth stage and the **SIRIUS 4** satellite into a suborbital trajectory, from which the Breeze M will place itself and the spacecraft into a circular parking orbit. Once **SIRIUS 4** is in the parking orbit, it will be propelled into its transfer orbit by a series of additional burns of the Breeze M. Separation occurs approximately 9 hours, 13 minutes after liftoff.

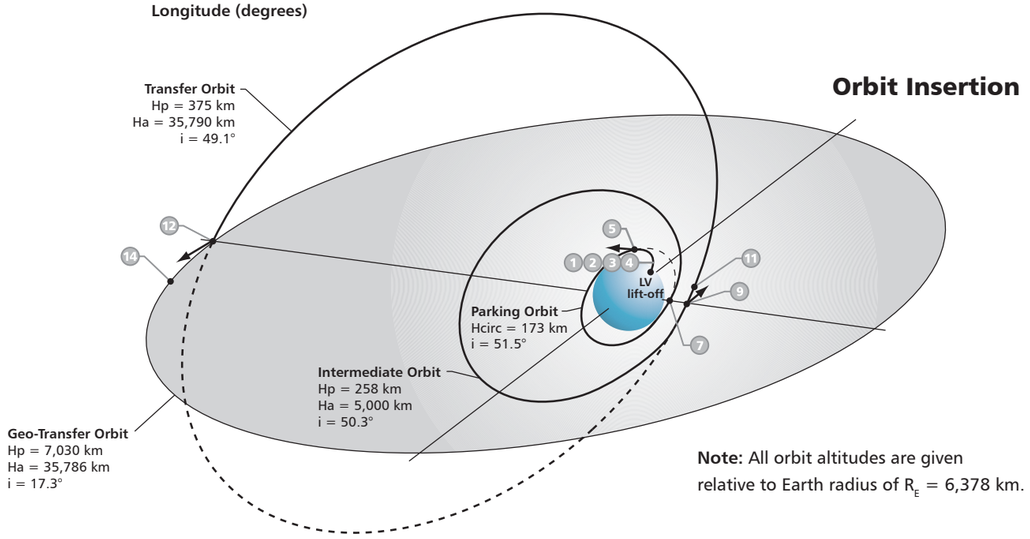


Ascent Profile



Ascent Ground Track

Orbit Insertion



Note: All orbit altitudes are given relative to Earth radius of R_E = 6,378 km.

Countdown and Flight Events Summary

EVENT	HR:MIN:SEC
Ignition Sequence Start	-00:00:02.5
Stage One Ignition, 40 Percent Thrust	-00:00:01.6
Command Stage One Thrust to 100 Percent	-00:00:00.9
Liftoff	**00:00:00.0**
Maximum Dynamic Pressure	00:01:06
1 Stage One/Two Separation	00:02:03
2 Stage Two/Three Separation	00:05:33
3 Payload Fairing Jettison	00:05:48
4 Stage Three Separation from Breeze M Upper Stage	00:09:46
5 Breeze M First Burn Ignition	00:11:20
6 Breeze M First Burn Shutdown	00:18:52
7 Breeze M Second Burn Ignition	01:08:22
8 Breeze M Second Burn Shutdown	01:24:47
9 Breeze M Third Burn Ignition	03:29:29
10 Breeze M Third Burn Shutdown	03:46:01
11 Additional Propellant Tank (APT) Jettison	03:47:22
12 Breeze M Fourth Burn Ignition	08:50:16
13 Breeze M Fourth Burn Shutdown	08:57:28
14 Breeze M/Spacecraft Separation	09:13:00