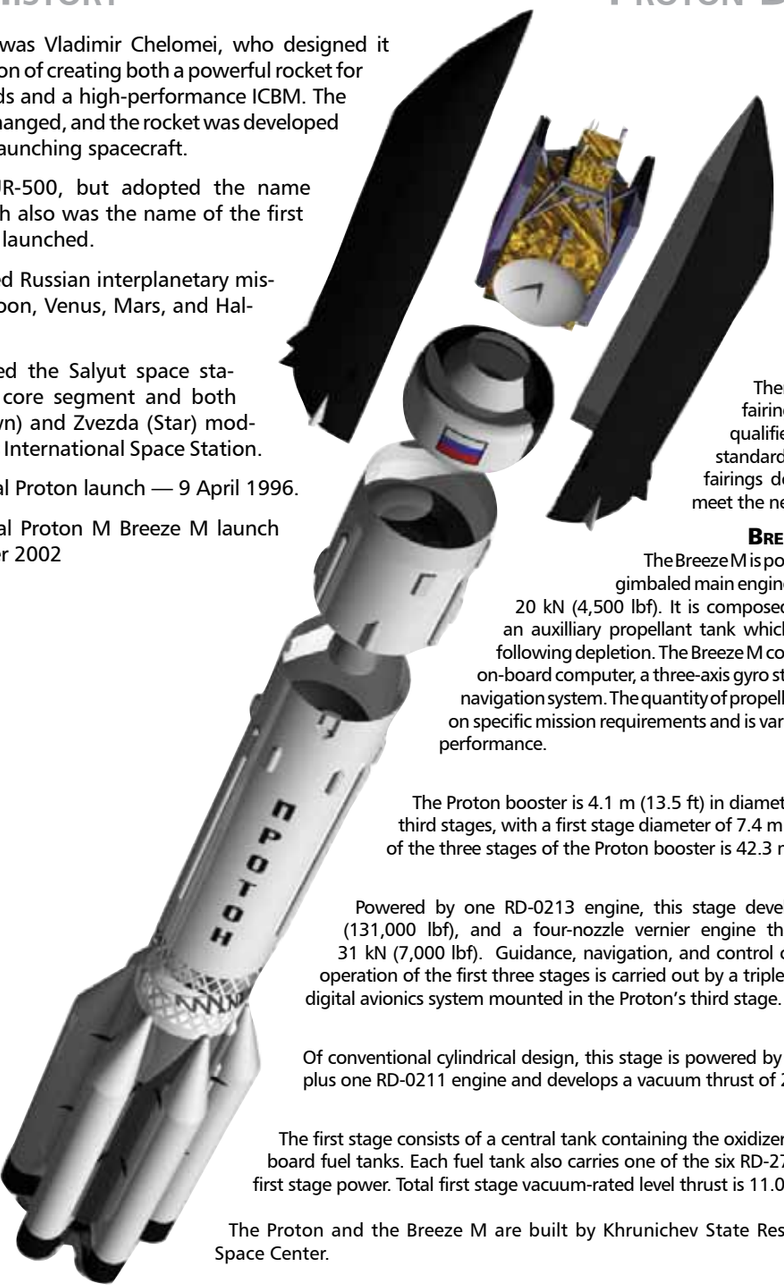
THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and 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 (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 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 customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

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).

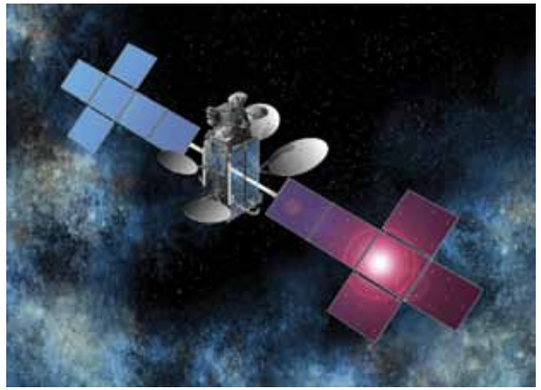
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 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-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

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

THE **SATELLITE**



Satellite Operator
EchoStar
www.echostar.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
6650 kg

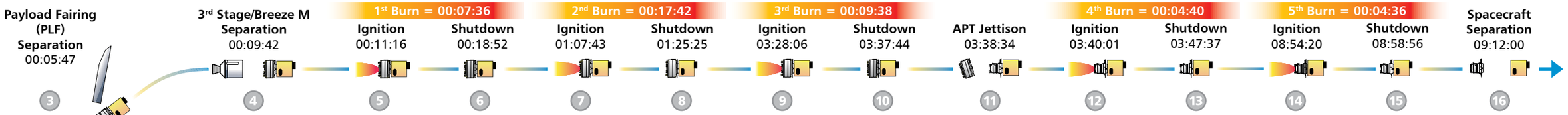
Satellite Mission Lifetime
15 Years

Satellite Mission
EchoStar XVI will join EchoStar's fleet of satellites that power global communication, commerce and entertainment. Operated by EchoStar, EchoStar XVI will be fully leased to DISH for use in its Direct-to-Home (DTH) services in the United States. An all Ku-band satellite with CONUS and spot beam transponders, EchoStar XVI will utilize SS/L's flight-proven 1300 spacecraft bus and be located at 61.5° west longitude. EchoStar XVI will further enhance EchoStar's position as the premier global provider of satellite operations and video delivery solutions.

EchoStar XVI

- **7th** ILS Proton Launch in 2012
- **76th** ILS Proton Launch Overall
- **5th** EchoStar Satellite Launched on ILS Proton
- **24th** Space Systems/Loral Satellite Launched on ILS Proton

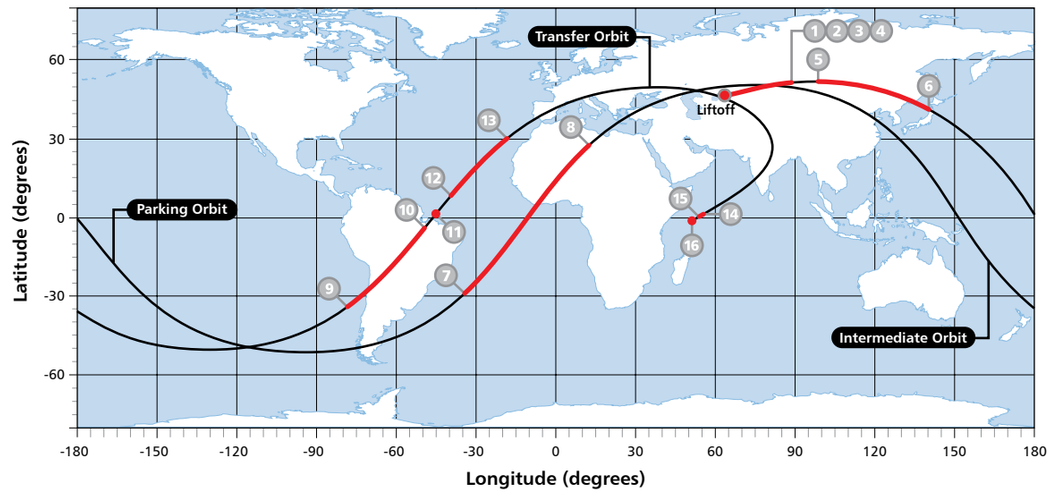
THE **MISSION**

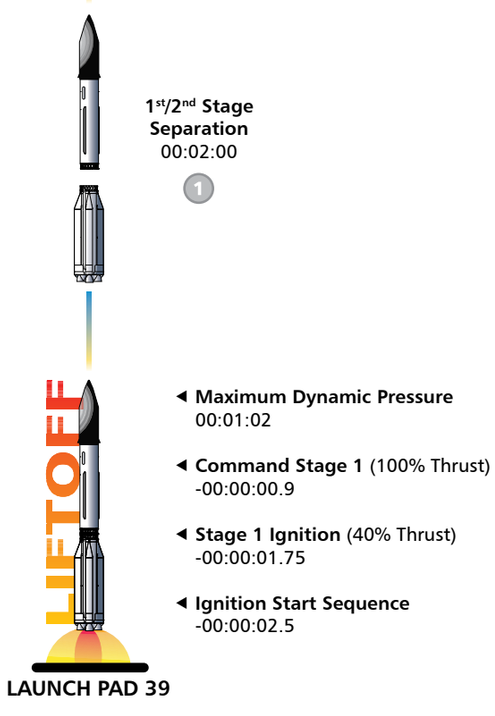


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the EchoStar XVI satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EchoStar XVI satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geo-stationary transfer orbit. Separation of the EchoStar XVI satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

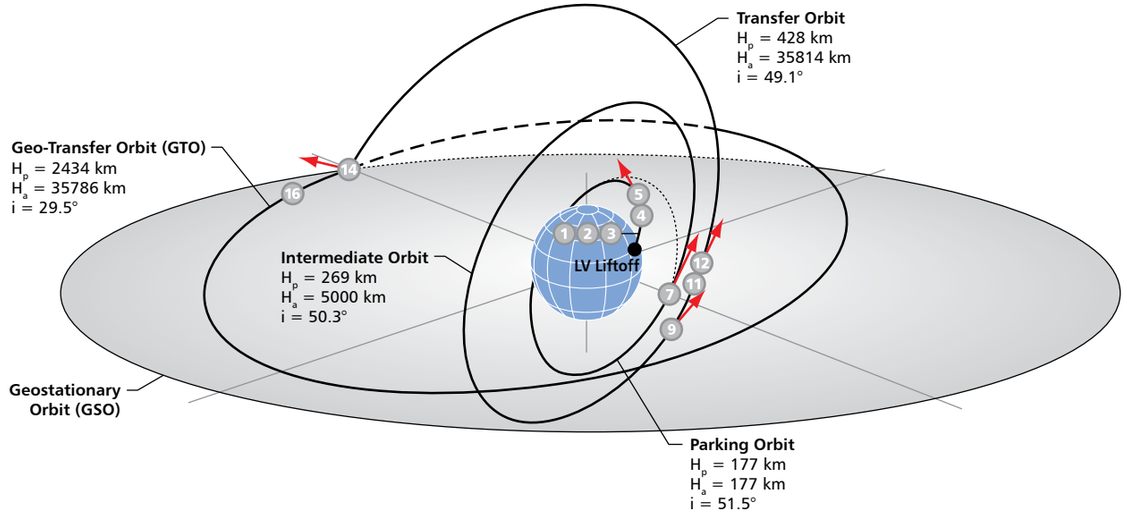
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN