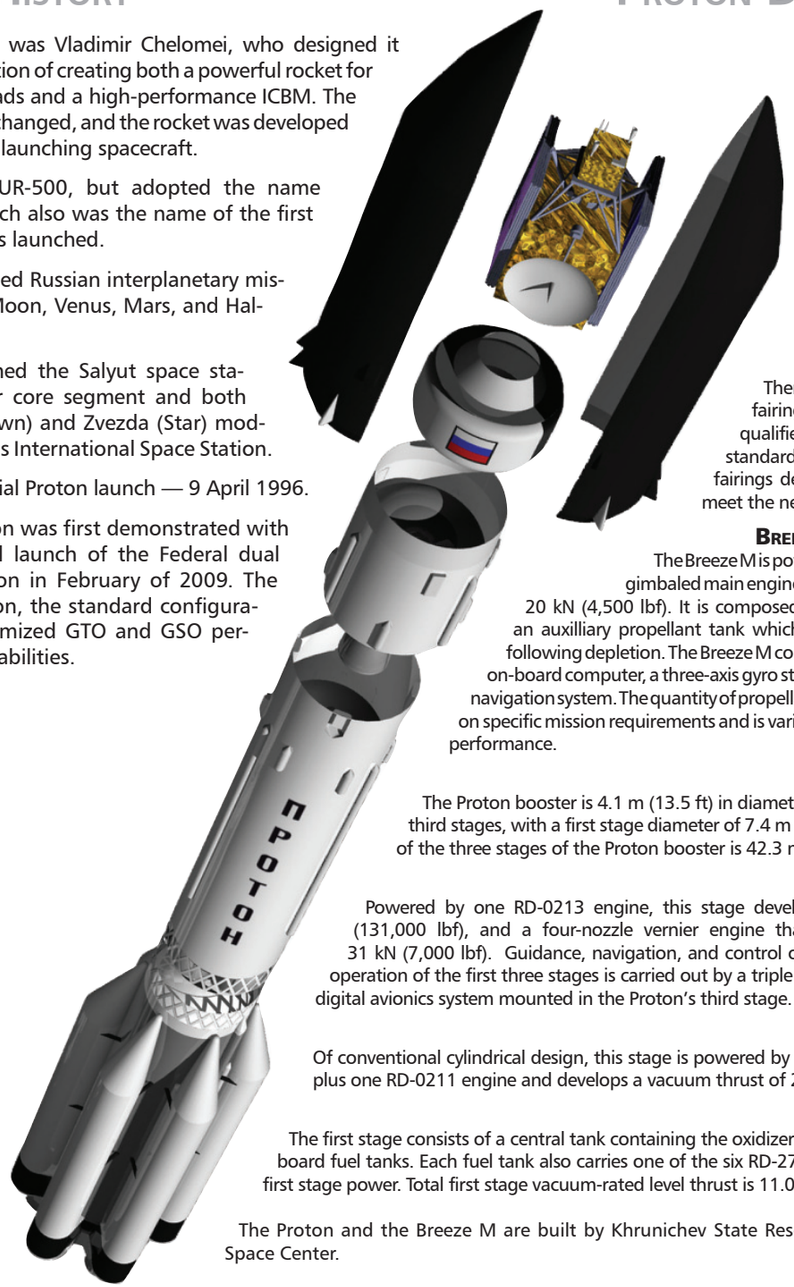
THE VEHICLE

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.
- Phase III Proton was first demonstrated with the successful launch of the Federal dual Express mission in February of 2009. The Phase III Proton, the standard configuration, has optimized GTO and GSO performance capabilities.

Proton Description



Total Height
58.2 m (191 ft)

Gross Liftoff 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).

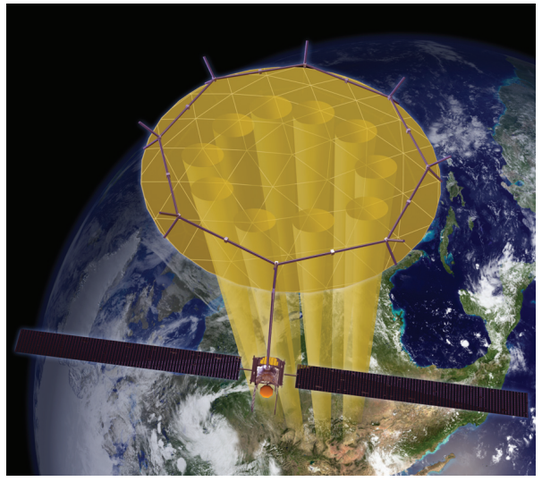
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant 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
LightSquared
www.lightsquared.com

Satellite Manufacturer
Boeing Space & Intelligence Systems
www.boeing.com

Platform
702HP designed for geomobile services

Separated Mass
5360 kg

Satellite Design Life
15 Years

Satellite Mission
The launch of SkyTerra 1 and successful network commissioning is a major step in LightSquared's creation of its next-generation, nationwide network that will be the world's first to combine satellite and terrestrial technologies. The LightSquared network will enable the company to offer 4G speed, value, and reliability which enables universal wireless connectivity throughout the United States.

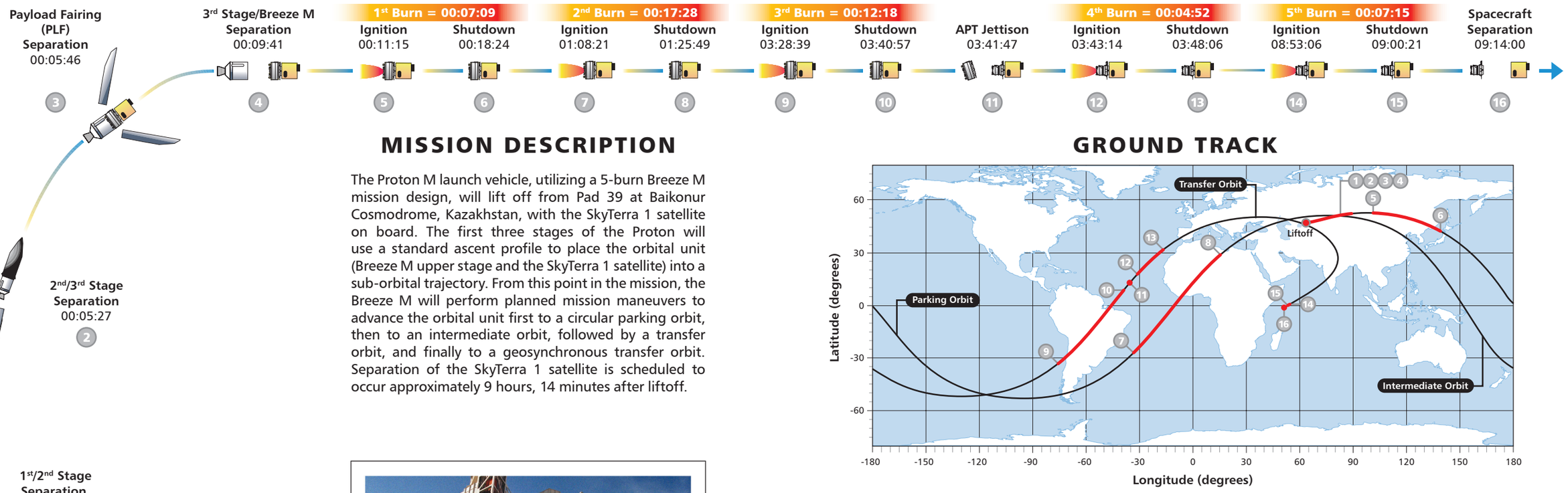
The company's next-generation satellite system allows users within the United States to use standard handsets or other devices, equipped with the LightSquared chipset, to access the satellite system with high link availability and long battery lifetimes with devices that have the same form-factor and functionality as conventional handsets and devices. Further, the combination of the LightSquared satellite system and the LightSquared 4G terrestrial network provides an unprecedented level of coverage throughout the United States.

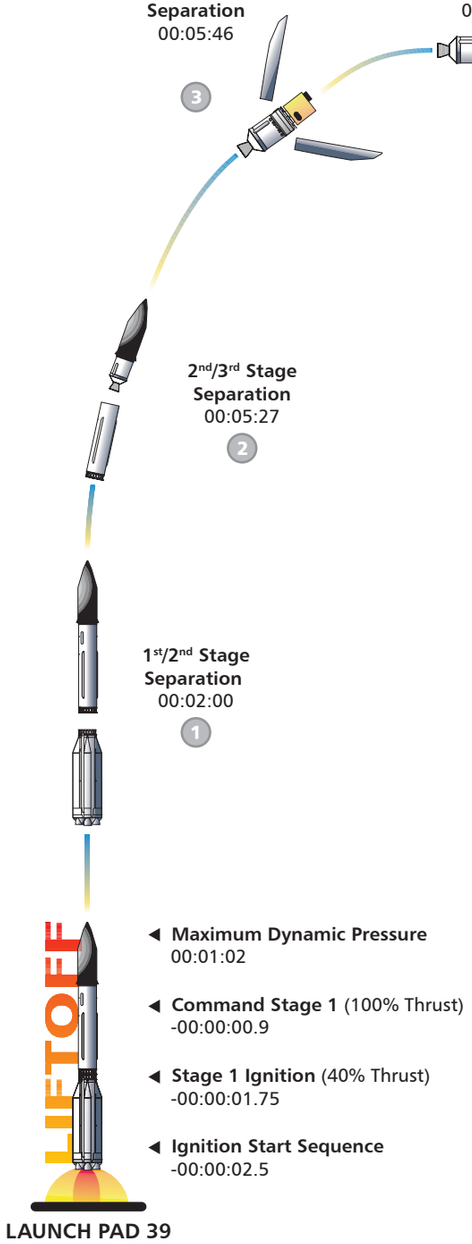
Mission Overview

SkyTerra 1

- **10th** Proton Launch in 2010
- **7th** ILS Proton Launch in 2010
- **63rd** ILS Proton Launch Overall
- **1st** LightSquared Satellite Launched on ILS Proton
- **14th** Boeing Satellite Launched on ILS Proton

THE **MISSION**





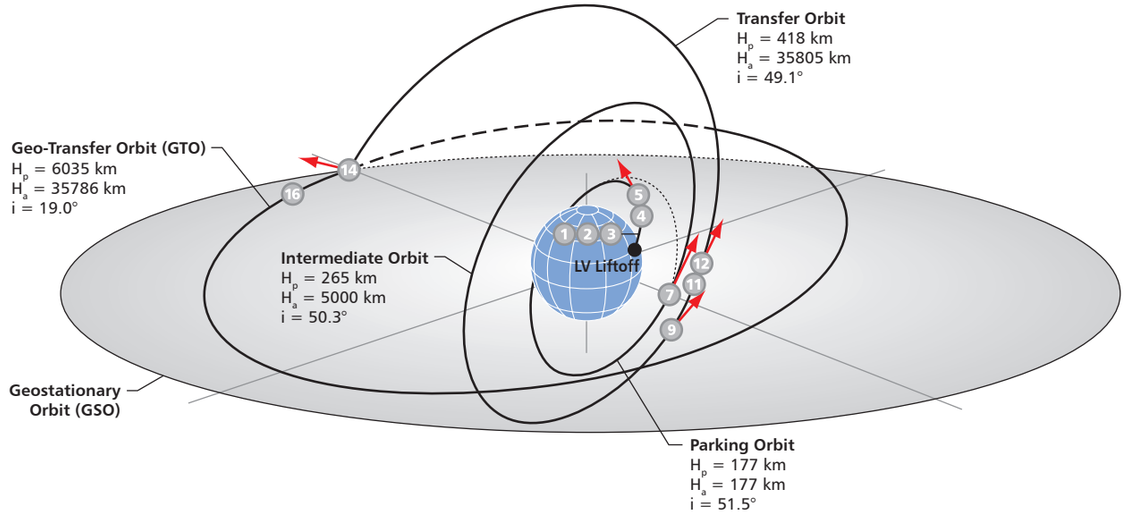
ASCENT PROFILE

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 SkyTerra 1 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 SkyTerra 1 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 geosynchronous transfer orbit. Separation of the SkyTerra 1 satellite is scheduled to occur approximately 9 hours, 14 minutes after liftoff.

PROTON ON PAD 39

GROUND TRACK



FLIGHT DESIGN