

# THE VEHICLE

# THE SATELLITE

## 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 - NimiQ 2 for Telesat

## PROTON DESCRIPTION

**TOTAL HEIGHT**  
56.2 m (184 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 auxiliary 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 out-board 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.



### SATELLITE OPERATOR

Telesat  
[www.telesat.com](http://www.telesat.com)

### SATELLITE MANUFACTURER

Space Systems/Loral  
[www.ssloral.com](http://www.ssloral.com)

### PLATFORM

SS/L 1300

### SEPARATED MASS

~4500 kg

### SATELLITE MISSION LIFETIME

15 Years

### SATELLITE MISSION

NimiQ 6 is a commercial communications satellite built by Space Systems/Loral. The satellite has a 32 transponder Ku-Band payload providing coverage of Canada. The satellite will be located at 91.1° West longitude. This satellite will be dedicated to the provision of direct-to-home services as part of Telesat's DTH fleet



## Mission Overview



**Experience ILS: Achieve Your Mission**

QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION



[www.ilslaunch.com](http://www.ilslaunch.com)

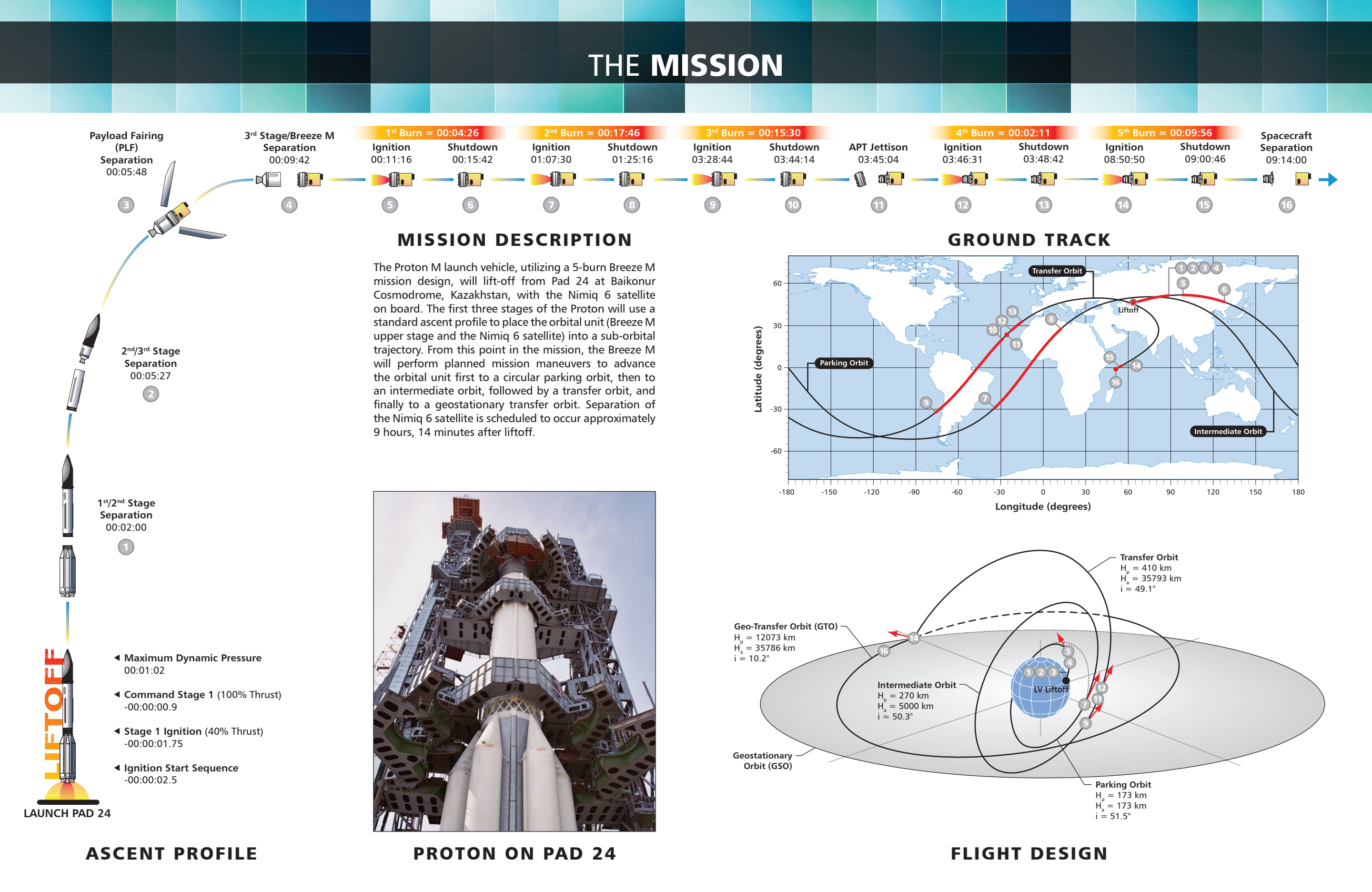
## NimiQ 6

- **8th** Telesat Satellite Launched on ILS Proton
- **4th** ILS Proton Launch in 2012
- **22nd** Space Systems/Loral Satellite Launched on ILS Proton
- **73rd** ILS Proton Launch Overall





# THE MISSION

[illegible][illegible]

# THE MISSION

### ASCENT PROFILE

**Payload Fairing (PLF) Separation** 00:05:48

**2<sup>nd</sup>/3<sup>rd</sup> Stage Separation** 00:05:27

**1<sup>st</sup>/2<sup>nd</sup> Stage Separation** 00:02:00

- Maximum Dynamic Pressure 00:01:02
- Command Stage 1 (100% Thrust) -00:00:00.9
- Stage 1 Ignition (40% Thrust) -00:00:01.75
- Ignition Start Sequence -00:00:02.5

**3<sup>rd</sup> Stage/Breeze M Separation** 00:09:42

Burn	Start Time	End Time
1 <sup>st</sup> Burn	00:04:26	00:11:16
2 <sup>nd</sup> Burn	00:17:46	01:07:30
3 <sup>rd</sup> Burn	00:15:30	03:28:44
4 <sup>th</sup> Burn	00:02:11	03:46:31
5 <sup>th</sup> Burn	00:09:56	08:50:50

**APT Jettison** 03:45:04

**Spacecraft Separation** 09:14:00

### GROUND TRACK

The ground track map shows the satellite's path from the launch site in Kazakhstan, through intermediate orbits, and finally into geostational orbit over Africa.

### MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift-off from Pad 24 at Baikonur Cosmodrome, Kazakhstan, with the Nimiq 6 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 Nimiq 6 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. Separation of the Nimiq 6 satellite is scheduled to occur approximately 9 hours, 14 minutes after liftoff.

### FLIGHT DESIGN

Orbit Type	Perigee ( $H_p$ )	Apoapse ( $H_a$ )	Inclination ( $i$ )
Parking Orbit	173 km	173 km	51.5°
Intermediate Orbit	270 km	5000 km	50.3°
Transfer Orbit	410 km	35793 km	49.1°
Geo-Transfer Orbit (GTO)	12073 km	35786 km	10.2°

**PROTON ON PAD 24**