

Mission Phases

The mission is segmented into five distinct phases: **1) Prelaunch**, **2) Launch and Early Orbit Phase (LEOP)**, **3) In-orbit Commissioning**, **4) Operations**, and **5) Post-mission**. Throughout each phase, various procedures are carried out, either commanded from the ground or autonomously performed by the satellite. This section delineates the expected duration of each phase and specifies the actions performed and how they are executed.

1) Prelaunch Phase: This preliminary stage, will take place between one and six months prior the launch, and is estimated to **span approximately two days**. Involves performing tests and validation processes to guarantee the proper functionality of all subsystems, right up until the satellite is integrated into the deployer. Moreover, meticulous visual examinations will be performed on the satellite's outer components to confirm they are in good conditions and have not suffered any damage. Upon completion of these final checks, the final software configuration parameters are uploaded, and all counters are reset to initialize the satellite in its initial flight conditions.

2) Launch and Early Operations Phase: This phase, which lasts about 10 hours, is autonomously handled by the spacecraft, starting after the launch, with the satellite being dispatched into space. Following deployment, the satellite's kill switches are deactivated, and it powers on automatically. Initially, the satellite remains in standby mode for the first 30 minutes to prevent collisions with other satellites or debris. Subsequently, the satellite may initiate Attitude and Determination Control Subsystem (ADCS) activities to stabilize itself while concurrently attempting to deploy the communication antenna. However, it will delay initiating periodic beacon transmissions until 15 minutes later (45 minutes post-deployment), adhering to requirements prohibiting radio emissions beyond this time. These periodic beacons facilitate ground tracking of the satellite.

3) In-orbit Commissioning Phase: This phase begins after the ground station receives the first beacon from the satellite which means that commanding from the ground can start. Is estimated to last less than a week. The telemetry data contained in the beacon allows operators to verify the satellite's and all subsystems' correct operation and the successful execution of LEOP autonomously by the satellite. Assuming no issues arise, operators can start sending specific commands such as "PING" to acknowledge signal reception and initiate communication, "UPDATETIME" to synchronize the satellite's clock, and "UPLOAD TLE" for orbital data proposes. Additional configurations and checks are performed, including payload antenna deployment. Once stabilized and operational, the satellite commanded by the ground, will undergo experimental testing and calibration, transitioning to the operational phase.

4) Operational Phase: The fourth mission phase, Operations, is where the satellite is expected to spend most of its orbital lifetime, approximately one to two years. During this phase, the satellite's health is monitored, payload operations are scheduled and executed, and housekeeping tasks are performed to maintain the satellite's functionality.

5) End of Life and Post-mission Phase: The final phase begins once the team decides to conclude operations, either because the payload is no longer functioning correctly or the satellite can no longer operate. Expected to commence after about two years of operations, the satellite enters a passivation state, gradually depleting its energy until battery exhaustion or atmospheric re-entry. During this phase, the Federated Satellite Systems (FSS) may remain operational, providing services to nearby satellites through a federation agreement.

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