

**- December 2007 -**

## **Mission**

The QuickReach™ Small Launch Vehicle (SLV) is a responsive small-lift vehicle designed to launch small satellites into Low Earth Orbit (LEO) within a 24 hour call-up for \$5 million launch price. This cost effective, accessible system will allow customers to quickly deploy small special purpose payloads for military, civil and commercial applications. Small satellites can use sensors to support events such as military operations, hurricanes, and forest fires as well as enable time-urgent communications in remote areas. QuickReach™ can also contribute to Operationally Responsive Space (ORS), a priority goal in the National Space Transportation.

## **Features**

The QuickReach™ SLV is 66 feet tall, 7 feet in diameter and weighs 72,000 pounds. The payload fairing is sized to fit a wide variety of small payloads. QuickReach™ is a two-stage vehicle comprised of an innovative liquid oxygen (LOX) and propane vapor pressurization (VaPak) propulsion system. The QuickReach™ liquid fueled rocket is carried to a launch point in the cargo bay of an unmodified Air Force C-17A or other large cargo aircraft. The AirLaunch patent-pending Gravity Air Launch (GAL) method relies on gravity to extract the rocket from the airplane. Only the QuickReach™ rocket and a small parachute leave the carrier aircraft – no pallets fall into the ocean or on land. The launch occurs at an altitude of 30,000 to 35,000 feet above sea level, which makes it easier for a two-stage rocket to place payloads into orbit. This launch method has many advantages over a ground launch from a fixed range. It simplifies operations, reduces weather delays, eliminates schedule conflicts, and enables launch to multiple orbits. Because QuickReach™ does not use turbopumps or mechanical gas pressurization systems. It can be scaled up with few changes to its basic components to meet larger payload markets.

## **Background**

AirLaunch is developing the QuickReach™ booster under the DARPA/USAF Falcon Small Launch Vehicle (SLV) Program. The Falcon SLV program goals are to develop a vehicle that can launch 1,000 pounds to LEO for less than \$5 million launch cost, within 24 hours of notice. Air launching has the added ability to launch to any azimuth, enabling similar performance to a variety of orbits.

AirLaunch has completed Phases 1 through 2B of the Falcon SLV program (with contract value of approximately \$30 million) and is currently executing Phase 2C (\$7.6 million in value).

In 2003, DARPA and the U.S. Air Force selected nine U.S. companies to compete for development of an SLV. In 2004, AirLaunch and three other companies were selected for Phase 2A. In October 2005, the program selected AirLaunch for contract continuance through Phase 2B, which AirLaunch completed in April 2007. AirLaunch began Phase 2C in June 2007.

Phase 2C focuses on the propulsion characterization of the company's LOX / VaPak propulsion system. This phase includes upgrades to hardware, instrumentation, and test stands; and a series of test fires on the Horizontal Test Stand (HTS) to gather data on engine performance and on the Vertical Test Stand (VTS) to more comprehensively characterize second stage performance.

As of November 2007, AirLaunch has conducted 55 test fires of its innovative propulsion system, all using VaPak. The QuickReach™ second stage engine has been fired 50 times, totaling over 400 seconds, on the HTS, in addition to several cold flow tests. Five additional test fires, totaling 315.5 seconds, have been performed with the engine on the VTS with the QuickReach™ Integrated Stage 2 (IS2), in addition to several propellant loading and conditioning tests. The IS2 firings incorporated ground propellant loading operations and flight-type avionics, software and systems. Transition of liquid oxygen to gaseous oxygen, a feature of VaPak, has been observed in test fires on both the HTS and VTS.

Previous accomplishments by AirLaunch include three record setting C-17 drop tests with a simulated full-scale, full-weight, inert QuickReach™ rocket; full-scale stage separation tests; implementation of a Mil-Std-882 safety process and completion of all safety tasks assigned to Phase 2B; and an Incremental Critical Design Review (I-CDR).

## **General Characteristics**

**Primary Function:** Space lift vehicle      **Builder:** AirLaunch LLC  
**Carrier aircraft:** Air Force unmodified C-17A or other large transport aircraft  
**Engine first stage:** 172,000 lb (vacuum) thrust LOX / propane engine  
**Engine, second stage:** Restartable 24,000 lb thrust LOX / propane engine  
**Length:** 66 feet      **Diameter:** 7 feet      **Weight:** 72,000 pounds      **Lift Capability:** 1,000 pounds to LEO  
**Payloads:** Operationally responsive spacecrafts, small satellites, technology payloads  
**Guidance System:** Inertial/GPS-aided navigation and control system  
**Projected first launch:** Approximately 2010  
**Launch Sites:** Anywhere a C-17 or other large transport aircraft can fly; initial flights will be from NASA Wallops  
**Launch cost:** \$5,000,000