

## Mars Sample Return Spacecraft Systems Architecture

### ABSTRACT

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The Mars Sample Return mission scheduled for launches in 2003 and 2005 is an ambitious plan to collect sets of scientifically valuable samples from two different sites on Mars and return them to Earth in 2008. The mission consists of 15 different vehicles and spacecraft plus two launch vehicles, with elements being provided by the U.S, France, and Italy.

These vehicles include two U.S. provided Landers, each with a sample collection Rover, Mars Ascent Vehicle, and an Orbiting Sample satellite. France is providing the sample return Orbiter which carries a U.S payload for sample detection and capture plus two Earth Entry Vehicles for landing the samples on Earth. The Orbiter also delivers four NetLanders to Mars for performing unique surface science.

This paper will discuss the driving requirements and key trade studies which led to the current baseline systems architecture. Spacecraft system designs will be presented along with technology drivers and heritage. The key interfaces between the different spacecraft will be described, along with key challenges such as aerocapture into Mars orbit, sample handling and containment, and automated Mars orbit rendezvous and capture.

Configuration drawings, block diagrams, and mass lists will be provided for each of the mission elements to provide a general overview of the system design. Reliability and redundancy issues will also be discussed.