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Executive Summary

The Hyperion Project proposes a design for the Lunar Transportation System (LTS) that will ensure valuable scientific exploration of the lunar surface. The design provides safe, reliable, and cost effective access of both crew and payload to the lunar surface. An innovative design for the LTS has been developed, utilizing unique orbit trajectories, efficient vehicle designs, and new vehicle subsystem elements.

Only existing launch vehicles and systems are used by the Hyperion Project's design, providing greater launch schedule flexibility. This allows the LTS to operate independently of the development of new launch systems, namely the Heavy-Lift Vehicle. The LTS will use a libration point as a vehicle staging point for the manned vehicles – the Crew Re-Entry Vehicle (CREV), the Crew Module (CM), and the Lunar Lander (LL). The CREV will be reusable and has the capacity to carry four crew members and accommodate 100 kg of payload on the return to Earth. The LL is designed with the capacity to carry the entire (four person) crew and 500 kg to the lunar surface. These vehicles and all necessary propulsion will be launched from earth in two phases. The first phase of launches will place the LL and its propellant in a low-Earth orbit (LEO), where they will dock together before performing a burn to the libration point between the Earth and the Moon (L1). The second phase will launch the CM, the CREV, and their propulsion systems into LEO, and will send them to L1. There the entire vehicle system will dock together and enter low lunar orbit (LLO). The crew will then enter the LL, detach from the CM/CREV system, and descend to the lunar surface. After the completion of the 4 – 7 day mission and procurement of the 100 kg return payload, they will ascend back to LLO in the LL ascent stage, dock with the CM/CREV system, enter the CM, and detach the LL. From their position in LLO, the crew will perform a burn that will place LTS in a Trans-Earth Injection (TEI) orbit, allowing them to re-enter Earth's atmosphere at the desired latitude for a safe recovery of crew and cargo. \

The CM is a completely unique vehicle design, resembling an International Space Station module more than Space Shuttle or an Apollo Command module. The LTS has a complete communications system structure, allowing for communication between crew and mission control at all times. The CM will also incorporate a new vehicle health monitoring system that will measure temperature and strain throughout the craft hull.

The orbit trajectory design allows the LL to land at any point on the lunar surface without the need for a large rover or for extensive Extra-Vehicular Activities (EVA). The CREV is designed to be a small, efficient launch and re-entry vehicle which could be used to ferry astronauts on future missions, including International Space Station re-supply missions. Because the LTS design is largely expendable, technological improvements and modifications can be made to the vehicles between missions, as they become available.

The design, development, tests, and evaluation (DDT&E) of the LTS vehicles is initially estimated at around $7.41 billion dollars (in fiscal year 2005 dollars). A fifteen mission lifetime would nominally require only five CREVs and fifteen LLs and CMs. The cost for all vehicles and mission operations would be roughly $99.4 billion, or $6.63 billion per mission. This total cost would be spread over several years, from 2006 (production go-ahead) to 2025 – this includes the ten year mission lifetime of the LTS – and would represent only a portion (about two-thirds) of NASA's allocated budget for exploration initiatives.