Proving Ground Potential Mission and Flight Test Objectives and Near Term Architectures

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NASA is developing a Pioneering Space Strategy to expand human and robotic presence further into the solar system, not just to explore and visit, but to stay. NASA's strategy is designed to meet technical and non-technical challenges, leverage current and near-term activities, and lead to a future where humans can work, learn, operate, and thrive safely in space for an extended, and eventually indefinite, period of time. An important aspect of this strategy is the implementation of proving ground activities needed to ensure confidence in both Mars systems and deep space operations prior to embarking on the journey to the Mars.

As part of the proving ground development, NASA is assessing potential mission concepts that could validate the required capabilities needed to expand human presence into the solar system. The first step identified in the proving ground is to establish human presence in the cis-lunar vicinity to enable development and testing of systems and operations required to land humans on Mars and to reach other deep space destinations. These capabilities may also be leveraged to support potential commercial and international objectives for Lunar Surface missions.

This paper will discuss a series of potential proving ground mission and flight test objectives that support NASA's journey to Mars and can be leveraged for commercial and international goals. The paper will discuss how early missions will begin to satisfy these objectives, including extensibility and applicability to Mars. The initial capability provided by the launch vehicle will be described as well as planned upgrades required to support longer and more complex missions. Potential architectures and mission concepts will be examined as options to satisfy proving ground objectives. In addition, these architectures will be assessed on commercial and international participation

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opportunities and on how well they develop capabilities and operations applicable to Mars vicinity missions.