ABSTRACT

This paper provides an overview of the Mars Laser Communications Demonstration Project, a joint project between NASA’s Goddard Space Flight Center (GSFC), the Jet Propulsion Laboratory, California Institute of Technology (JPL), and the Massachusetts Institute of Technology Lincoln Laboratory (MIT/LL). It reviews the strawman designs for the flight and ground segments, the critical technologies required, and the concept of operations. It reports preliminary conclusions from the Mars Lasercom Study conducted at MIT/LL and on additional work done at JPL and GSFC. The lasercom flight terminal will be flown on the Mars Telesat Orbiter (MTO) to be launched by NASA in 2009, and will demonstrate a technology which has the potential of vastly improving NASA’s ability to communicate throughout the solar system.

INTRODUCTION

In the near future the National Aeronautics and Space Administration anticipates a significant increase in demand for long-haul communications services from deep space to Earth. Distances will range from 0.1 to 40 AU, with data rate requirements in the 1’s to 1000’s of Mbits/second. The near term demand is driven by NASA’s Space Science Enterprise which wishes to deploy more capable instruments onboard spacecraft and increase the number of deep space missions. The long term demand is driven by missions with extreme communications challenges such as very high data rates from the outer planets, supporting sub-surface exploration, or supporting NASA’s Human Exploration and Development of Space Enterprise beyond Earth orbit.
one high performing terminal to allow operations close to the sun.

Lasercom will enable bandwidth-hungry instruments, such as hyper-spectral imagers, synthetic aperture radar (SAR) and instruments with high definition in spectral, spatial or temporal modes to be used in deep space exploration. The Mars Laser Communications Demonstration Project will provide much needed engineering insight by the end of this decade.
CONCLUSION

The Mars Laser Communications Demonstration...

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