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SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Near-Earth and Interplanetary Communications (1)

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SYMPOSIUM KEYNOTE: MARS EXPLORATION COMMUNICATIONS RELAY NETWORK SUPPORT FOR THE MARS SCIENCE LABORATORY (MSL) LANDING AND OPERATIONS

Abstract

This paper summarizes how NASA's Mars Exploration Program (MEP) uses three Science Orbiters to perform the relay communications and bring real time data from the Mars Science Laboratory (MSL) mission to Earth. NASA's MEP depends on Science Orbiters as a relay communications asset for landers to transmit science data to Earth. Currently there are three orbiters around Mars that form a network that can provide the relay communications to landed assets on the surface such as the rover Curiosity. This international network includes 2001 Odyssey Orbiter (ODY) and Mars Reconnaissance Orbiter (MRO), both from NASA, and ESA's Mars Express Orbiter (MEX). These orbiters were strategically positioned to provide critical event coverage during MSL's Entry, Descent, and Landing (EDL) and the subsequent operations phase of Curiosity. The MSL mission landed the Curiosity Rover on the surface of Mars on August 6, 2012, beginning a one Martian year primary science mission. The EDL communication plan took advantage of unique and complementary capabilities of each orbiter to provide a robust network set to capture the information during this critical event while also providing low-latency information during the landing. Since on the surface, ODY and MRO have provided effectively all of Curiosity's data return from the Martian surface, while MEX stands ready to provide backup relay support should NASA's orbiters become unavailable for some period of time. The presentation will discuss the extensive preparations required for the relay support for MSL and present data rates, data volumes, and link performance obtained through the orbiters so far. The paper also shows the importance of satellite relay orbiters in science data return for future Mars Landers and the importance of a robust international space communications network for Space Exploration.