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MARS SCIENCE ORBITERS RELAY COMMUNICATIONS NETWORK SUPPORT FOR THE MAR
EXPLORATION ROVER (MER), MARS SCIENCE LABORATORY (MSL), AND FUTURE MARS
2016, 2018 AND 2020 LANDERS

Abstract

This paper summarizes how Mars Science Orbiters support the relay communications from Mars to Earth for the Mars Exploration Rover (MER) Opportunity, the Mars Science Laboratory (MSL) Curiosity mission, and the plan to support future missions such as the Mars 2016, 2018 and 2020 landers. NASA depends on Science Orbiters as a relay communications link 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 rovers MER Opportunity and Curiosity. This international network includes 2001 Odyssey Orbiter (ODY), Mars Reconnaissance Orbiter (MRO), and soon MAVEN all from NASA, and ESA's Mars Express Orbiter (MEX) and the future 2016 ExoMars Trace Gas Orbiter. These orbiters are strategically positioned to provide critical event coverage during Entry, Descent, and Landing (EDL) and the subsequent operations phase of the landers. After the landers are on the surface of Mars, the Orbiters have provided effectively all of the data return from the Martian surface and the same is expected to occur for the 2016, 2018 and 2020 missions. The presentation will discuss the capabilities and preparations required for the orbiters to provide relay support to the landed assets (rovers or fixed landers) and present data rates, data volumes, and link performance that can be obtained through the orbiters. The paper also shows the importance of satellite relay orbiters in science data return for Mars Landers and the importance of a robust international space communications network for Space Exploration.