

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 1 (3A)

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RELAY TELECOMMUNICATIONS FOR THE COMING DECADE OF MARS EXPLORATION

Abstract

Over the past decade, an evolving network of relay-equipped orbiters has advanced our capabilities for Mars exploration. NASA's Mars Global Surveyor, 2001 Mars Odyssey, and Mars Reconnaissance Orbiter (MRO), as well as ESA's Mars Express Orbiter, have provided telecommunications relay services to the 2003 Mars Exploration Rovers, Spirit and Opportunity, and to the 2007 Phoenix Lander.

Based on these successes, a roadmap for continued Mars relay services is in place for the coming decade. MRO and Odyssey will provide key relay support to the 2011 Mars Science Laboratory (MSL) mission, including capture of critical event telemetry during entry, descent, and landing, as well as support for command and telemetry during surface operations, utilizing new capabilities of the Electra relay payload on MRO and the Electra-Lite payload on MSL to allow significant increase in data return relative to earlier missions.

In 2013, NASA's Mars Atmosphere and Volatile Evolution (MAVEN) mission will launch. This Scout-class mission will carry a single-string Electra relay payload, augmenting NASA's relay network after it completes its primary science mission. And in 2016, ESA and NASA will jointly launch the ExoMars/Trace Gas Orbiter (TGO) mission, a hybrid science/telecom orbiter that will provide relay support through the rest of the decade and into the 2020's. Planned users of the ExoMars/TGO relay services include the ESA EDL Demonstrator payload that will be deployed by the ExoMars/TGO orbiter during final approach to Mars in 2017, as well as a joint 2018 NASA/ESA mission that will use an MSL-heritage landing system to deliver two rovers to the surface: the NASA Mars Astrobiology Explorer-Cacher (MAX-C) and the ESA ExoMars Rover.

In this paper we will outline this Mars relay roadmap, quantifying relay performance over time, illustrating planned support scenarios, and identifying key challenges and technology infusion opportunities.