Abstracts

Microwave Systems Applications in Deep Space Telecommunications and Navigation: Space Exploration Initiative Architectures

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The United States Space Exploration Initiative (SEI) calls for the charting of a new and evolving manned course to the Moon, Mars, and beyond. The fundamental SEI support objectives are to provide the mission with means to monitor and control mission elements, acquire engineering, science, and navigation data, compute state vectors and navigate, and move these data efficiently and automatically between mission nodes for timely analysis and decision-making. Microwave links provide the means to communicate between system nodes, and the essential radio metrics to navigate; later, these likely will be augmented with optical links. Although these objectives do not depart, fundamentally, from those evolved over the past 30 years in supporting deep space robotic exploration, there are several new challenges. This paper first familiarizes the reader with the general mission telecommunications and navigation support requirements and resulting architectures for SEI mission support, and then discusses the implications of these on the role of microwave technology in these architectures, particularly for Mars exploration support. Effective use of microwave technology is enabling, and obviously the sine qua non of the mission support architecture.

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