

## **Abstract Submission**

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### **An Autonomous Ground Station for Low-Cost Support of Deep Space Missions**

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A fast-track prototype effort has begun to validate the concept of a fully-autonomous ground station that reduces the life-cycle costs of tracking deep space missions with NASA / JPL's Deep Space Network (DSN). The prototype station, known as the Deep Space Terminal (DS-T), provides a modular architecture, which offers simplified implementation and operation, with functions partitioned between hardware and software in order to provide the system flexibility and control. This approach permits the right combination of commercial and DSN-specific equipment to be used for a cost-effective and high-performance ground station. The heart of the DS-T is a UNIX workstation which runs the station without operator intervention through the use of a schedule executive. The schedule can be provided in advance by a central planning facility; individual missions can also access the system in order to directly schedule activities or modify earlier plans.

The prototype terminal is being designed for operation at X band. It will be capable of receiving telemetry at rates from 2.2 Mbps to 10 bps and will uplink commands from 2 kbps to 7.8 bps. The terminal is being implemented at DSS-26 using a 34 m beam waveguide antenna and a 4 kW transmitter. The terminal will interface with mission control over commercial communication links using TCP/IP protocols. Telemetry data will be automatically forwarded to mission operators and to principal investigators. Two demonstrations are being planned for 1998: a downlink demonstration with Mars Global Surveyor in January '98 and an uplink validation demonstration with a spacecraft of opportunity in late '98.

The paper will describe the design of the prototype terminal, discuss the capabilities of this class of low-cost ground stations, and explore their application to reduce the life-cycle cost of mission operations. Preliminary results from the downlink demonstration will be presented. Plans for infusion of this approach into the operational DSN will be discussed.