

Title: **The Square Kilometer Array as a Spacecraft Tracking Facility**

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Abstract: The SKA will provide dramatic benefits for the space science community in addition to the radio astronomy community. The primary advantage for spacecraft tracking is a two-orders-of-magnitude (or more) increase in sensitivity over the existing Deep Space Network. This increase can be used either to obtain much higher telemetry downlink data rates, or to support much smaller and lighter spacecraft. Additional advantages include flexible sub-arraying and multi-beaming to allow simultaneous tracking of multiple spacecraft, increased reliability through the use of large numbers of identical array elements, and very accurate real-time angular position measurements for spacecraft navigation. Future space missions in many disciplines will benefit from this huge increase in ground-based tracking capability. Most importantly, new opportunities for less expensive or completely different types of missions will be created. Examples of new kinds of missions include landers, rovers, or atmospheric probes that transmit data directly to Earth without an orbiter for data relay, low-cost spacecraft without a high gain antenna or high power RF amplifier, limited-lifetime missions to hostile environments, and extremely deep space (interstellar) probes. This work is being carried out at the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.